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A COMPARISON OF DOMAIN SAMPLING PROCEDURES FOR TEST CONSTRUCTION

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A key issue in test development is how to sample the content domain to ensure that the test best represents the target of measurement. How one approaches the selection of test content reflects a test content theory. This study was an effort to investigate the effects of different test content theories, as operationalized by the domain sampling procedures used, on test scores and the inferences that can be made from those scores.

Sample tests were constructed and compared to each other in terms of test reliability, content validity, and construct validity to assess the relative efficacy of different domain sampling strategies across varying item sample sizes. It was hypothesized that tests constructed using a strong test construct theory approach would yield greater evidence of reliability, content validity and construct validity and that the efficacy of strong test content theory test construction would increase as test length decreased. Neither hypothesis was supported. Implications of these results and suggestions for future research are discussed.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PREFACE

Data used in this study was collected as Task 024 under Contract F41689-86-D0052 by Universal Energy Systems, Inc., for the Technical Training Division of the Armstrong Laboratory's Human Resources Directorate.

A COMPARISON OF DOMAIN SAMPLING PROCEDURES FOR TEST CONSTRUCTION

CHAPTER 1

INTRODUCTION

In education, business, industry, and the military it is common practice to assess an individual's current skills or level of knowledge of a subject area by use of a test, typically a multiple choice test. This type of test, often called an achievement test, is held distinct from a test aimed at determining an individual's potential future skills or knowledge, often called an aptitude test. An achievement test developer can be anyone -- a personnel director, classroom teacher, researcher, or a trained, experienced test development team. The test itself can range from a brief, short-answer test to assess basic mathematical abilities to a lengthy, comprehensive licensing examination. However, the tests are developed to reach a common general goal -- to assess an individual's current skills and/or knowledge in a given subject domain.

The specific goal of the test brings to the fore another distinction in the classification of tests. Tests can be classified either as norm-referenced or criterion-referenced, although these categories are not mutually exclusive. The 1985 Standards for Educational and Psychological Testing (American Educational Research Association, American Psychological Association, and National Council on Measurement in Education) defined a norm-referenced test as "an instrument for which interpretation is based on the comparison of a test taker's performance to the performance of other people in a specified group" (p.92). Popham (1978) stated that a norm-referenced test is designed to "ascertain an examinee's status in relation to the performance of a group of other examinees who have completed the test" (p.24). Messick (1989) referred to norm-referenced score interpretation that "indicates where the examinee stands relative to other people who took the test" (p.44). Nitko (1984) referred to norm-referencing scores as "those that convey to the knowledgeable test interpreter information about an examinee's standing relative to others in a defined group" (p.8). These definitions emphasize that norm-referenced test scores are used to infer relative ability or achievement rather than a degree or absolute level of achievement or ability in a domain.

The concept of a criterion-referenced test is somewhat abstract and is still in the process of formulation by workers in the field (Nitko, 1984). Popham (1978) defined a criterion-referenced test as one "used to ascertain an individual's status with respect to a well-defined behavioral domain" (p.93). Some authors make the distinction between a criterion-referenced test, a domain-referenced test, an objective-referenced test, and a mastery test (Nitko, 1984). When this distinction is made, the term "criterion-referenced test" often implies a test with an associated cut-off or passing score that represents mastery/nonmastery status. The term "domain-referenced test" often refers to the ability of a test score to describe an examinee's status on a well-defined domain of behaviors, with no cut-off score implied. An objective-referenced test is a test with each item corresponding to a behavioral objective. A mastery test is defined as any test used to provide information about whether or not a pupil has mastered a given instructional goal. Mastery is usually conceived "as 'knowing more of a domain" (Nitko, 1984, p.23).

The 1985 Standards for Educational and Psychological Testing (American Educational Research Association, et al.) defined a criterion-referenced test as one that "allows its users to make score interpretations in relation to a functional performance level, as distinguished from those interpretations that are made in relation to the performance of others" (p.90). The 1985 Standards defined a domain-referenced test as one that "allows users to estimate the amount of a specified content domain that an individual has learned" (p.91). The two definitions are cross-referenced, indicating the overlap between them. Messick (1989) made the distinction between a criterion-referenced interpretation, that "treats the score as a sign that the respondent can or cannot be expected to satisfy some performance requirement in a situation unlike the test" (p.44) and a domain-referenced interpretation that "treats the score as a domain sample indicating what level of difficulty the person can cope with on tasks like those in the test" (Cronbach, 1984, p.44).

Gronlund (1976) noted that the terms domain-referenced, criterion-referenced, objective-referenced and universe-referenced have been used by some authors with somewhat the same meaning. Nitko (1984) noted that the term "domain-referencing" might be preferable to "criterion-referencing" as the commonly-used, preferred term but that testing specialists have decided that "criterion-referencing" should remain the preferred term for a variety of reasons.

For the purposes of this paper, the broad definition of a criterion-referenced test as presented by Glaser and Nitko will be used. This definition states that a criterion-referenced test "is one that is deliberately constructed to yield measurements that are directly interpretable in terms of specified performance standards" (1971, p.653). The performance standards are specified by defining a class or domain of tasks that the individual should be able to perform. From this domain of tasks, measurements are taken on "representative samples of tasks drawn from the domain" (p.653). Criterion-referenced tests "are specifically constructed to support generalizations about an individual's performance relative to a specified domain of tasks" (p.653). Using this definition, a criterion-referenced test can be used to make a mastery decision; however, it is not assumed that the assignment of mastery/nonmastery status is the goal of the test. A treatment of the issues related to setting of cut-off scores is beyond the scope of this paper.

As previously mentioned, the categories of norm-referenced tests and criterion-referenced tests are not mutually exclusive. Nitko (1984) noted that a test can provide both norm-referencing and criterion-referencing information. He stated that "norm-referenced data are needed to interpret fully an examinee's criterion-referenced test performance" and that "criterion-referencing and norm-referencing provide complementary information" (p.25). Millman and Greene (1989) noted that when both interpretations are desired, the specifications of test content should "clearly delineate the bases of both sets of inferences" (p.342). Also, Messick (1989) warned that when two or more scoring measurement models are combined, confusion can result about what construct theory to reference and what kinds of construct validity evidence should be investigated.

Criterion-referenced tests have gotten much attention in the testing arena in the last several years. Popham (1978) noted that the expression "criterion-referenced measurement" was first used in 1962 (Glaser & Klaus, 1962). Recent emphasis on accountability in testing, formative evaluation, computer-assisted instruction, and individualized instruction has resulted in widespread interest in criterion-referenced tests that can be used to make instructional and program decisions (Mehrens & Lehmann, 1980). However, the issue of the interpretation of a test score has been of interest for a great many years. Popham (1978) noted that E. L. Thorndike, in 1913, raised the issue of an absolute versus a relative interpretation of test scores, suggesting that while a teacher giving marks for "some obscure standards of absolute achievement" may know what those marks represent in terms of achievement, the student and others can only interpret them in terms of standing relative to other students. The goal of those involved in criterion-referenced test development has been to overcome the problem of test score interpretation, developing tests that give both the test user and the examinee meaningful information about what the examinee's performance on the test actually reflects (Popham, 1978).

There are many decisions that a test developer must make in constructing a criterion-referenced test and many constraints to the options available. Among other things, the test developer must determine what the test is to measure, what the test scores are to be used for, the level of detail to be tested, the format of the test, and the length of the test. Additionally, the issues of test reliability and validity must be addressed if one is to have any confidence in the usefulness of the test results.

Typically, the general content domain of the test the level of detail of the test items, and the purpose for which the test scores are to be used are specified at the outset. The item format chosen is often a function of both what is to be measured and the objectivity and ease of scoring required by the situation. In skills/knowledge tests the multiple choice format is commonly chosen due to its objectivity and speed and ease of scoring. However, content of the test items is a matter that is often left to the judgment of the test developer.

In dealing with issues of test content selection it is useful to have a set of categories, or definitions, in mind. In his discussion of work sample test development and content validity, Guion (1979) referred to the set of all possible behaviors relevant to the measurement goal (job performance) as the job content universe. That portion of the job content universe identified for testing was labelled the job content domain. The set of all possible test items that can be developed for the job content domain was referred to as the test content universe. Finally, the sample of items taken from the test content universe to make up the test was called the test content domain. Test content selection in this framework is seen as a process of successive sampling.

The 1985 Standards defined "content domain" as "a body of knowledge, skills, and abilities defined so that items of knowledge or particular tasks can be clearly identified as included or excluded from the domain" (p.90). Domain sampling was defined as the "process of selecting test items to represent the specific universe of performance in which a test developer is interested" (p.91).

Hambleton (1984) noted that in the typical criterion-referenced testing situation, a real or hypothesized domain or population of test items is available. He defined domain score as "the expected or true proportion of items that an examinee can answer correctly from the whole domain or population of items" (p.145).

For the purposes of this paper a definitional scheme is used that is similar to Guion's and consonant with the 1985 Standards. Figure 1 illustrates this definitional scheme. The term content domain is used to refer to the body of knowledge, skills, and/or abilities identified as the target of measurement. The set of all possible items that could be developed for the content domain is referred to as the test content universe. The test content sample will be defined as the sample of items selected from the test content universe to make up one form of the test. In practice, because the test content universe is rarely defined, the content domain is often directly sampled and test items developed based on that sample. In the literature on test construction and interpretation, many authors make no distinction between sampling the content domain and sampling the test content universe. Thus, when reference is made to domain sampling it is assumed that domain sampling also includes the associated sampling of items from the test content universe. The term domain score refers to the expected or true percentage of items from the test content universe that an examinee can answer correctly.

In the development of a test it is rarely possible to construct and administer items that completely exhaust the content domain. Time and expense considerations constrain what can be covered in any given testing situation. Thus, unless the content domain is very narrowly defined, it is necessary to rely on samples of test items from the test content universe to estimate an individual's domain score. The quality of the generalizations or inferences made from resultant test scores is directly related to the quality of the content domain definition and the quality of the sampling of the test content universe. To make valid generalizations to the content domain, that domain must be well-defined and the item sample must be relevant to and representative of it. This requirement to represent the content domain also extends to the selection of types of items, item quality, and the administration and scoring procedures used. The critical question becomes: To what extent is a person's observed score on this test likely to reflect his/her standing on the content domain? This is a question of test validity.

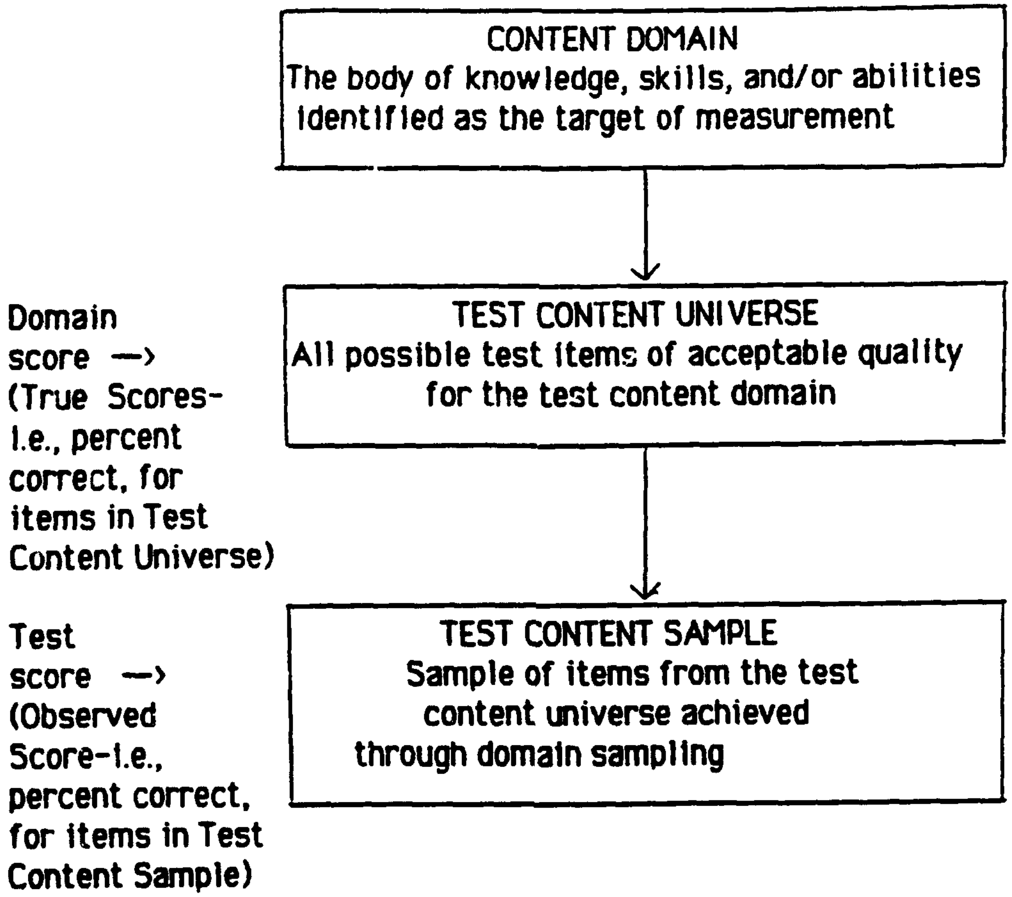

Figure 1. The Definitional Framework for This Study.

Validity concerns how well a test measures what it purports to measure (Anastasi, 1982; Allen & Yen, 1979). Thus, validity refers to the accuracy of predictions or inferences made from test scores (Cronbach, 1971). Validity must be established taking into consideration the particular use of the test (Anastasi, 1982).

Quality tests are constructed with validity in mind. The test developer aims to develop a test that measures the characteristic he/she has set out to measure, whether it is a trait, aptitude, or achievement.

The first step in test development is the specification of what is to be measured. The content domain identifies and defines the target of measurement. The test content universe can then be specified, theoretically, as all possible good quality test items that can be developed for the content domain. Obviously, it is rarely practical or possible to specify the entire test content universe. Test specifications typically consist of a content outline that specifies the proportion of the items from each content area in the outline. A sample of items is selected or constructed in accordance with the test specifications.

It is in this process of content specification and item sampling that the content validity of the measure is ultimately determined. While this construction process is the focus of content validity evaluation, it also has direct impact on the criterion-related and construct validity of the test. Misspecification of any of the areas of interest, from the content domain to the test content universe, or an inappropriate test content sampling procedure, will result in the measurement of something other than what was intended.

The need for research dealing with the particulars of test specification has been recognized. Berk (1984a) stated that such research is "sadly, ... almost totally nonexistent" (p.32). Referring to a comprehensive review of research on criterion-referenced testing by Hambleton, Swaminathan, Algina, and Coulson (1978), Berk noted that only the work of Ebel (1962) and Hively, Patterson, and Page (1968) discussed the topic of test specifications, and neither empirically investigated the efficacy of various forms of test specifications.

The current interest in and growing dependence on criterion-referenced tests to make meaningful instruction, selection, classification, certification, and program evaluation decisions make it critical that test developers have information to help in making content selection decisions. While expert judgment about a test's content representativeness has served in the past to answer challenges to test-based decisions, empirical information is needed to justify test content decisions. This research addressed this need by evaluating the effects of different content selection strategies on tests covering a specified content domain. Reliability and validity of tests developed through different content selection strategies were evaluated and compared. Also, because test development time and testing time often constrain the number of items that can be developed and administered (thus, constraining domain coverage), the effects of test length also was considered.

CHAPTER II

RESEARCH LITERATURE REVIEW

Test Construction and Use

The primary uses of criterion-referenced tests are for educational and occupational decision making. These tests are frequently used to determine if an individual has attained the skills and knowledges that are the goal of the educational process or if the individual has the skills and knowledges requisite for a given job. Such tests are often constructed by a teacher, trainer, or personnel specialist who must decide what exactly to include in the test and how.

While the planned use of the test scores determines whether it will be criterion-referenced or norm-referenced, there is little difference in the test construction tactics used. The selection of item type (e.g., essay vs. multiple-choice), item construction rules, and administration procedures do not differ to any real degree in criterion-referenced and norm-referenced tests (Popham, 1978). Tinkelman (1971) and Millman & Greene (1989) covered in detail the steps taken in planning an objective test. Green (1981) presented an overview of test construction, administration and use, placing his discussion in the context of multiple-choice group testing of cognitive ability. Guidelines for the construction of tests also can be found in Gronlund (1968 & 1976), Shields (1965) and Popham (1978). Roid and Haladyna (1982) gave in-depth coverage to test item writing. Extensive treatment of tests and measurement has been given by Anastasi (1982). Thorndike (1971) and Linn (1989) have provided an encyclopedic treatment of the area of test construction and use, giving in-depth treatment to a broad range of issues and concepts such as test design, construction, administration, processing, test theory and application. A good coverage of technical issues in the field of testing has been given by Allen and Yen (1979). Lord and Novick (1968) and Lord (1980) have provided advanced treatments of technical issues in testing. Specific attention to criterion-referenced testing within a more general treatment of testing was given by Crocker and Algina (1986).

Selection of Test Content

The real difference in the construction of a criterion-referenced test is in content selection. Of course, norm-referenced test content should be related to the content domain. However, if overall content relevance can be shown and predictive validity can be demonstrated, the descriptive quality of a norm-referenced test content is not held to intense scrutiny. In contrast, a criterion-referenced test is intended to estimate the amount of a specified content domain that an individual has mastered. Thus, the descriptive quality of the criterion-referenced measure is a critical issue and a major problem facing criterion-referenced test developers. The descriptive quality of a test is a direct reflection of the test content (Popham, 1978). Nunnally (1972) stated that the major source of error in most psychological measures relates to the sampling of content.

Several authors have addressed the issue of what Popham refers to as the test's descriptive scheme (1978). Popham includes in the rubric of "descriptive scheme" anything from a simple behavioral objective to an elaborate set of test specifications. The purpose of the descriptive scheme is to communicate to the item writers what kind of items are to be included in the test and to test users what the test is measuring. There are many approaches to developing a "descriptive scheme," or test specifications, for a test.

Typically, the test constructor (or test construction team) has a good general idea of the content domain to be covered by the test. It could be an instructional area, a job, or an area of certification. The test constructor is faced with the task of defining the precise content domain and determining which content elements should be tested, since it is virtually impossible to test everything in the domain because of time constraints. The definition of the content domain can vary widely from test to test. For example, the definition of the content domain may be fairly general and broad -- such as a listing of major historical events covered by a history class, it may be more specific -- as with well-written educational objectives, or the definition may be highly detailed -- as with tests based on a detailed job analysis used to make employment decisions.

The descriptive scheme also may include the type of behavior the examinee should exhibit for each content area. This often reflects a taxonomy -- such as the Taxonomy of Educational Objectives (Bloom, Englehart, Hill, Furst, & Krathwohl,1956; Krathwohl & Payne, 1971), that outlines categories of knowledge, intellectual abilities and skills. This yields an often-used, two-way outline, or test-blueprint chart. Elements of the outline are usually weighted on importance, and these weights determine the relative emphasis (i.e., number of test items) the element receives in the test (Adkins-Wood, 1961; Gronlund, 1968; Kubiszyn & Borich, 1987). The weights usually reflect judgments of the relative importance of the elements to the goals of instruction or job; they are not a direct reflection of the breadth of the content area or the number of possible items associated with the element. An outline without weights, in which each element has an equal number of items, reflects an underlying equal weighting scheme. It is possible that some tests are constructed without an a priori weighting of content area, such as when more items are constructed on content areas in which item construction is easy or in an area favored by the test constructor (Adkins-Wood, 1961); however, this is not good test construction practice.

The test outline is used to guide test item development. There is, theoretically, an underlying universe of test items from which the sample of test items is taken. Item development constitutes sampling from the universe; this sampling is assumed to be a random or a stratified random process. The weighted test outline typically can be viewed as a stratified random sampling procedure, as can the construction of almost any mental test (Lord and Novick, 1968).

In a review of the issue of content representativeness, Messick (1989) pointed out that the notion of content sampling has not been universally accepted. He noted

Loevinger's (1965) questioning of the notion of sampling when no actual universe of items or testing situations exists and when items are constructed, not sampled. This argument was countered by Cronbach's (1971) assertion that the important requirement is that the boundaries of the universe be sufficiently well specified to allow one to decide whether any particular item is included in the universe. Messick pointed out that the assumption of sampling from a universe allows the use of inferential models to make inferences to a universe of items or tasks like those constructed or observed; thus, one can generalize from sample performance to universe performance.

Messick suggested that there is the trivial sense of sampling items from a large previously constructed pool. However, sampling from a large item pool is not sampling from the test content universe unless the item pool is coterminous with the universe. He suggested that it would be nontrivial if the operative properties of all items that could possibly appear in the universe, and thus the test, could be specified. In that case the adequacy of the coverage of the universe could be appraised.

Often in certification, selection, or classification tests the content area is highly detailed, and the issue of weighting becomes critical. The constructor of such tests is often called upon to defend the content selection scheme, as with the National Academy of Science review of military job performance testing (Wigdor & Green, 1986). However, little information is given in the research literature on the impact of various weighting schemes on test properties. Adkins-Wood (1961) warned that "the real or effective weights of different components are not always what they appear to be" (p.36). She went on to explain that variance in the different test components (content areas) as well as in correlated components affects the contribution of each component to the information provided by the total test in terms of determining individual differences. For example, if all examinees get the same score on all the items in a test component, that component tells you nothing about individual differences except that there are none on that component. This is a major issue in norm-referenced tests, where interest is usually in the differences that exist rather than absence of differences. Also, if responses on items from two different test components are correlated, an individual's total test score is dependent on something more than is reflected by the test outline. This could result in unclear test score interpretation.

Glaser and Nitko (1971) stated that criterion-referenced tests are constructed to support generalizations about an individual's performance relative to a domain of instructionally relevant tasks. Thus, criterion-referenced tests are appropriate only to well-defined domains in which it is clear which categories of performance or kinds of tasks are and are not potential test items (Nitko, 1984). Nitko also distinguished between ordered and unordered domains. An ordered domain might reflect the varying degrees of subject matter difficulty or complexity, degrees of proficiency, prerequisite learning or developmental sequences, or latent trait location wherein the behavior domain represents a single dimension or factor underlying performance. In contrast, many domains that are important representations of learning outcomes cannot be ordered but still require clear definition. Criterion-referenced tests vary widely in the number of items they include and the breadth of the content areas they cover.

Test Content Theory

The issue of developing and evaluating a test's descriptive scheme can be classified under the general term of test content theory. In the context of this paper, test content theory refers to the rationale, or theory, about the content area which underlies the test specifications developed to guide test construction. Discussions of test content theory and the investigation of the test specifications span the areas of test reliability and validity, as well as the reliability of the test's descriptive scheme. A review of the research literature relevant to test specifications and test content, test reliability, and test validity follows.

Linn (1980a) noted that the primary focus in achievement test construction should be on the content of the items. He suggested that item generation starts with the definition of the content domain complete enough that all potential items can be enumerated, at least implicitly. He observed that few examples of relatively complete domain specifications can be found.

The most common application of test content theory is in the development and use of a test outline, or blueprint. Ideally, the elements of the test blueprint and the associated weights should reflect an underlying theory of what constitutes a competent individual in a given domain and the behaviors such an individual should be able to demonstrate.

Guttman's facet theory (Berk, 1978) and Popham's (1984) amplified objectives are examples of intermediate positions between complete specification and the traditional table of content specifications. Guttman (1980) suggested that there have been many theories of test scores, but not of content structure and specification. He later called for test constructors to focus on the "sharp design of content" (1980, p.93). He stated that facet theory provides a fruitful design of content and that "proper treatment of content can be done only in the context of theory construction" (1980, p.94). Guttman made the distinction between a taxonomy and a theory, asserting that a taxonomy refers only to the definitional part of a theory, but by itself is not a theory. He suggested that facet theory relates two basic features of an observational system: 1) the framework for defining the content of the universe of observations and 2) the empirical distribution of the observations carried out within this framework of design.

Using Guttman's approach, proposed in 1958 and 1969, the investigator specifies the facets, or logical dimensions, of a domain in terms of such aspects as content, form, and complexity. The facets are then systematically crossed in a factorial fashion, yielding a Cartesian product representing the facet design of the domain. This provides the basis for a mapping sentence or item-generation rule for determining the item universe. This fully specifies the domain as well as the items or tasks that might appear in the item universe (Dancer, 1986). Thus, the potential item universe is specified (Messick, 1989). Facet theory has been applied most successfully in the area of attitude measurement.

Popham (1984) discussed the importance of an unambiguous description of what a test is measuring in the context of criterion-referenced test construction. He made the point that without unambiguous specifications, a criterion-referenced test has no advantage over norm-referenced measures. He described the ideal situation of having explicit test specifications and congruent test items leading to accurate interpretation of what an examinee's test performance means. He described the specification strategy used by the Instructional Objectives Exchange (IOX). The emphasis of this strategy is not on overall description of the content domain but, rather, on specification of elements of the domain and item writing rules.

Osburn (1968) discussed generalization beyond test items and the need for an unambiguous basis for generalization. He suggested that the basis for generalization "must be contained in the operational definition of the procedures used in generating and sampling items that go to make up the test" (p.96). To that end, all possible items should be specified in advance, and random sampling or stratified random sampling from the universe of content should take place. These are requirements of a universe-defined test, which provides an unbiased estimate of an individual's score on an explicitly defined universe of item content.

Messick (1989) discussed the application of "universe-defined" tests, proposed by Osburn (1968) and Hively, Patterson, and Page (1968), in which the content domain is analyzed into a hierarchical arrangement of item forms. Each item form contains wording, variable elements, and rules for replacing those elements. Messick noted that the "direction of the argument flows not from a domain specification to an item sample but from an item form to an item universe" (p.40). He also noted that Guttman's mapping-sentence approach is more applicable to broad domains.

Little is known about how well content specifications work and how they might be improved (Linn, 1980b). A "duplicate-experiment" was suggested by Cronbach (1971) to validate rigorously the fit between the operational definition of the universe and the actual test operations. This study, earlier approximated by Ebel (1962), called for the construction of two versions of a test by two independent test construction teams using the same content specifications strategy. The adequacy (or reliability) of the specifications would be judged by the degree of equivalence between the two forms.

In an evaluation of a Department of Defense project to measure military job performance, the National Academy of Sciences Committee on the Performance of Military Personnel (Wigdor & Green, 1986) suggested the use of random sampling techniques to select test content, contrasting that technique to a judgment-based sampling approach. Each of the various approaches used by the Military Services (Army, Navy, Air Force, and Marines) to construct performance measures for this project had a judgmental component in the selection of test content (Human Resources Research Organization and American Institute for Research, 1984; Lammlein, 1987; Lipscomb, 1984; Maier & Hiatt, 1985).

Discussing job proficiency test development, the Committee acknowledged practical problems such as insuring optimal domain coverage with limited test time, hands-on testing of dangerous tasks or tasks involving expensive equipment, and "face validity" from the perspective of both test takers and those using the results. While they believed that an expert judgment approach to content selection addressed those problems, the representativeness of the sample should be the major concern.

The Committee asserted that a random sampling approach's major contribution is that it "permits a known degree of representativeness" (p.50). Random sampling "allows one to make, with known margins of error, statements that can be generalized to the entire universe" (p.46). The report noted that a judgmental approach to sampling introduces a "measurement bias that cannot be precisely estimated" (p.57). The Committee pointed out that initial stratification, prior to content selection, could be used to increase precision. However, the report also noted that sampling a content domain was not as simple as sampling from a population of people; people already exist as separate units whereas organizing a domain into separable units is a difficult undertaking (Wigdor & Green, 1986).

Berk (1980) compared six content domain specification strategies, each attempting to provide an unambiguous domain definition and explicit rules for generating criterion-referenced test items. He used the criteria of clarity, simplicity, availability, development time and costs, adaptability, and domain appropriateness. He noted that the precision of the specifications was inversely related to practicality. His evaluation focussed on the domain specification-item writing linkage and did not address the overall definition of the domain.

Other potentially useful techniques have been suggested for investigating test specification strategies. Dickinson (1984) suggested sensitivity analysis (Fischoff, 1980) to assess the effect of test specifications changes on test responses. Jarjoura and Brennan (1983) demonstrated the use of multivariate generalizability theory (Cronbach, Gleser, Nanda, & Rajaratnam, 1972), analyzing data resulting from multiple forms of a test. Kane (1982) discussed a multifacet sampling model, based on generalizabilty theory, which highlights the weaknesses of some routinely made inferences. He expressed the hope that such a model would encourage research aimed at defining universes more precisely. Covariance structure analysis (Joreskog, 1978, Linn & Werts, 1979) has been suggested to analyze the reliability of different test forms.

Gottfredson (1986) suggested procedures for determining the equivalence of alternative criterion measures. Five general aspects of equivalence were discussed: validity, reliability, susceptibility to compromise (i.e., changes in validity or reliability with extensive use), financial cost, and acceptability to interested parties. These procedures also could be applied to evaluate the equivalence of tests developed under different content selection strategies.

In discussing the role of content-oriented procedures in developing job performance measures, Gottfredson emphasized that "it is by no means an atheoretical task to define the content domain of a job or to sample from it" (p.30). She also noted that while the care taken in enumerating and sampling tasks in a content domain creates the aura of construct validity and relevance it says nothing about the relevance of the domain as it was defined. She emphasized that the construct validity and relevance of a measure is not established by detailing the techniques used to construct it but by research on the resulting test scores and the adequacy of the theories underlying the development and interpretation of the measure. She suggested that the great strength of content-oriented test construction for validation purposes is the rich source of a priori hypotheses that can be tested empirically.

Domain Sampling and Test Length

Test length is usually constrained by limits of testing time and time available to construct test items. Therefore, it is necessary to rely on a sample of items from the test content universe to estimate an individual's true content domain score. How well the individual's score on the sample of test items reflects that individual's true content domain score can be affected by examinee guessing, test administration problems, ambiguous items, and nonrepresentative sampling of test items (Hambleton, 1984a). However, the impact of ambiguous or nonrepresentative items should be less in a large sample of items than in a small item sample. Unfortunately, many test developers do not have a good grasp of how long the test should be and tend to develop tests to fit the time constraints.

The relationship between observed scores on the test content sample and the true score on the content domain is reflected in the test's reliability and validity. The impact of test length on test characteristics has been widely investigated in the context of both classical test theory and item response theory. Lord and Novick (1968) summarized the relationships among domain scores, test length, and reliability. These relationships are applicable to criterion-referenced tests intended to estimate domain scores (Hambleton, 1984a). Other authors have investigated the relationship of test length and classification errors when test scores are used to assign examinees to mastery states. Hambleton (1984a) reviewed methods to determine the test length needed to reduce classification errors. Hambleton reviewed methods making use of the binomial model (Millman, 1972, 1973), Bayesian methods (Novick & Lewis, 1974), an "indifference zone" (Wilcox, 1976), computer simulation methods (Eignor & Hambleton, 1979; Hambleton, Mills, & Simon, 1983) and item response theory (Birnbaum, 1968; Lord, 1980).

The relationship between test length and estimates of the content domain score is highly relevant to investigations of test content selection. Classification accuracy is critical for those criterion-referenced tests used in making classification decisions. The quality of the domain estimate is critical to accurate classification decisions.

The effect of test length is most apparent on the test's reliability. Lord and Novick (1968) stated that "if the length of a test is increased *n* times by adding parallel measurements, the composite true-score variance increases by the factor n^2"; however, "the variance of the composite error score increases only by a factor of n^2" (p. 86). Thus, the true score (domain score) variance increases more rapidly than the error score variance. It is this relationship that makes increasing the test length beneficial. This relationship of true score variance to error score variance is reflected in the test's reliability coefficient that, in turn, sets an upper limit to the square of the test's validity coefficients. Lord and Novick (1968) also discussed the effect of test length on validity, noting that "validity increases more slowly with length than does reliability" and "validity increases more quickly with length when the initial reliability is low, and decreases less quickly with length when the initial reliability is high" (p. 115).

Crocker and Algina (1986) noted, in their discussion of test length and reliability, that projections of the reliabilities of tests of various lengths using the Spearman-Brown prophecy formula are accurate "only if items added or removed are parallel in content and difficulty to items on the original test" (p.146). They also note that increases in test length follow the law of diminishing returns, in that doubling the length of a test will result in a larger increase in reliability than will occur if the same number of items is again added to the test. This means that, at some point, the small increases in reliability will not justify the time and effort required to add additional items. In discussing reliability coefficients for criterion-referenced tests, they note that increasing test length increases the generalizability of the test scores and the decision consistency. However, the magnitude of the impact of test length on decision consistency is dependent on the specific situation.

The problem for the criterion-referenced test developer is that these characteristics of tests assume a very homogeneous content domain and the addition of parallel items, which is rarely the case when developing criterion-referenced tests other than those measuring simple functions such as mathematical skills. Additionally, the methods traditionally used to assess test reliability were developed for norm-referenced tests and have limited application to criterion-referenced tests.

Assessment of Test Quality

Test Reliability

The increased use of criterion-referenced testing (vice norm-referenced testing) has led to the development of new techniques. These techniques address the different goals of a criterion-referenced test (i.e., assessing the degree of mastery of a domain or assigning a mastery classification). However, consistency of measurement is a common goal for both criterion-referenced test and norm-referenced tests.

There are several key reasons why traditional techniques for estimating the reliability of norm-referenced tests are not appropriate for criterion-referenced tests

(Popham, 1978). First, norm-referenced test reliability assessment techniques rely on correlational procedures. These techniques require an adequate amount of variance in the test responses for meaningful results to be obtained. Unlike norm-referenced tests, criterion-referenced tests are not deliberately designed to yield variability in test responses.

Additionally, even with sufficient variance, correlations of test scores only reflect the relative degree of association. For example, a test-retest analysis could reflect high agreement in the relative standing of individuals taking the test on two occasions while the test scores could reflect markedly different levels of domain mastery across the two testing situations.

Finally, internal consistency estimates, while often applied to criterion-referenced tests, reflect only the homogeneity of the items. Internal consistency is most relevant to the investigation of test item characteristics when the goal of the test is to assess competency on a homogeneous domain. Wick (1973) suggested that the notion of reliability is difficult to interpret and apply to criterion-referenced tests.

Several reviews and assessments have been made of the techniques developed to estimate criterion-referenced test reliability. These have been presented in the literature by Hambleton, Swaminathan, Algina, and Coulson (1978), Linn and Werts (1979), Millman (1979), Berk (1980b), Brennan (1980), Shepard (1980), Subkoviak (1980), Traub and Rowley (1980), Berk (1984c), and Crocker and Algina (1986).

In their treatment of reliability assessment for criterion-referenced tests, Crocker and Algina (1986) distinguished between the two purposes of such tests and discussed the assessment of their reliability in the context of the purpose of the test. One purpose discussed was the estimation of domain scores. The other purpose was the assignment of mastery/nonmastery status, or, mastery allocation. In addition to these two categories, Berk (1984) discussed the category of reliability estimates relevant to the reliability of criterion-referenced scores. These techniques were covered by Crocker and Algina under the category of assignment of mastery/nonmastery status. Such techniques reference individual scores to a cut-off score as with the mastery/nonmastery classification methods. Berk's third category can be seen as an extension to the assessment of mastery-nonmastery decisions that takes into account a "sensitivity to degrees of mastery and nonmastery along the score continuum in addition to the qualitative master-nonmaster classification" (p.246).

Reliability assessment of tests used to make mastery classifications focuses on decision consistency and the accuracy of the mastery allocations made. Decision consistency concerns the extent to which the same decisions are made based on two different forms of the test or across two administrations of the same test (Crocker & Algina, 1986). Techniques have been developed to estimate decision consistency based on a single administration of the test. Assessment of a test's decision accuracy requires the estimation of the probabilities of false-positive (assigned mastery when actually a nonmaster) and false-negative (assigned nonmastery when actually a master) outcomes. These agreement indexes are based on the assumption of classically parallel test forms (Berk, 1984).

More relevant to the issue of test content theory is the estimation of the reliability of domain score estimates. Berk (1984) characterized domain score reliability estimates as being "concerned generally with estimating the stability of an individual's score or proportion correct in the item domain, independent of any mastery standard" (p.252). Algina and Crocker (1986) discuss reliability theory for domain score estimates based on generalizability theory (Cronbach, Gleser, Nanda, & Rajaratnam, 1972). Generalizability theory provides a basis for investigating the extent to which a sample of measurements generalizes to the measurement universe. Analysis of variance is used to decompose score variance into that attributable to various testing conditions and that attributable to true score variance. Generalizability theory allows the estimation of variance associated with test forms versus that associated with the examinees. Randomly parallel test forms are assumed in generalizability theory (Osburn, 1968).

Berk (1984) also reviewed individual-specific statistics that are defined, computed, and interpreted separately for each individual and are used to set a confidence interval around that individual's score. He also discussed a method, not based on generalizability theory, to compute an estimate of the standard error of measurement.

Test Validity

Validity has been treated extensively in the literature. Cronbach (1971) presented an in-depth treatment of test validity, making the point that "One validates, not a test, but an interpretation of data arising from a specified procedure" (p.447). The standards for educational and psychological tests and testing (American Psychological Association, et al., 1974; American Educational Research Association, et al., 1985) discussed validity as an inference. These documents discussed two broad classes of validity questions, those dealing with inferences about what the test measures and questions about the test's usefulness as a predictor of other variables. The documents also presented a discussion the three "types" of validity - content, construct, and criterion-related. Test validation procedures are typically classified within these three categories.

These three types of validation procedures are interrelated and overlapping, with each addressing a specific aspect of the test and the interpretation of scores on the test. Broadly defined, content validity refers to the extent to which the content of the test represents the behavioral domain to be measured. Criterion-related validity reflects the effectiveness of a test in predicting a person's behavior in a specified situation, either concurrently with the test or in the future. Construct validity is concerned with the extent to which a test measures a theoretical construct or trait. It is evaluated by investigating the degree to which certain explanatory concepts account for performance on the test (American Psychological Association, et al., 1974; American Educational Research Association, et al., 1985; Cronbach, 1971). A detailed exposition of construct validity has been outlined by Cronbach and Meehl (1955).

Several authors have called for a more unified view of test validity. In his discussion of validity and ethics of assessment, Messick (1980) discussed validity as inference from evidence suggesting that "different kinds of inferences from test scores require different kinds of evidence, not different kinds of validity." He suggested that validity is the "general imperative in measurement" as the overall "degree of justification for test interpretation and use" (p.1014). Dunnette and Borman (1979) have suggested that the categorization of validity into "types" leads to a simplistic view of the validity issue. Landy (1986) made a case for validation as hypothesis testing. However, his emphasis on investigating the predictive power of the test was criticized by Messick (1989), who asserted that the validation process should begin with a focus on explanation, not prediction. The 1985 Standards for Educational and Psychological Testing (American Educational Research Association, et al., 1985) presented validity as a unitary concept, referring to categories of validity (i.e., content-related, criterion-related, and construct-related) rather than types of validity.

Content-Related Validity. Content-related validity has been given treatment in general texts on testing, such as Anastasi (1982) and Cronbach (1971), and in articles dealing with issues specific to the topic. Ebel (1956) discussed content validity as it pertains to educational achievement tests, making the point that "all types of validity are based ultimately on the content validity of some measurement procedures" (p.281). He suggested that the best evidence of content validity is obtained through the "detailed, systematic, critical inspection of the test itself" (p.281).

The issue of content validity has gotten much attention from those involved in personnel testing due to legal requirements to show job relatedness of job selection procedures, as provided in the Uniform Guidelines on Employee Selection Procedures (1978). Lawshe (1975) discussed content validity of personnel tests, suggesting that there was, at the time of the article, a "paucity of literature on content validity in employment testing" (p.563). He presented a conceptual framework in which to fit content validity into the personnel field, discussing the concept of job content validity. He also presented an approach to the quantification of content validity. Gavin (1977) and Prien and Ronan (1971) also discussed content validity as applied to personnel testing.

Lennon (1956) outlined three assumptions underlying the use of content validity: 1) that the area of concern to the tester can be conceived as a meaningful, definable universe of responses, 2) that a sample can be drawn from this universe in some purposive, meaningful fashion, and 3) that the sample and the sampling process can be defined with sufficient precision to enable the test user to judge how adequately performance on the sample typifies performance on the universe. Anderson (1972) stated that the "primitive, first requirement for a system of measurement" is that there is a clear and consistent definition of the things to be measured (p.145).

Several authors have discussed what actually constitutes content validity if, indeed, it can properly be considered as a type or category of validity. Messick (1975) suggested the use of the term "content relevance" or "content representativeness" instead of content validity. Linn (1980a), in a discussion of validity for criterion-referenced measures, viewed content validity as restricted to the items of the test, excluding examinee responses to the items from the definition. Additionally, he stated that "few would consider content validity to stand on an equal footing with the other two types of validity in terms of the rigor of the evidence that is usually provided to support a claim of validity" (p.548). Hambleton (1980) also discussed content validity as pertaining only to the content of the test and not to examinee responses. Benson (1981) suggested that item writing, item format, test instructions, and item readability be considered in the content validity of achievement scores.

Guion (1977) included both the stimulus and response components of the test in the consideration of content validity and suggested a set of five minimal conditions for the acceptance of a measure on the basis of content validity: 1) the content domain must involve "behavior with a generally accepted meaning" (p.6), 2) the definition of the domain must be unambiguous, 3) the domain must be relevant to the purposes of the measurement, 4) "Qualified judges must agree that the domain has been adequately sampled" (p.7), and 5) the measure must have reliability. In a discussion of content fairness, Guion (1978) pointed out that the scoring system influences the validity of the inferences made and, thus, a representative sample of the content domain does not assure validity. He agreed with Messick (1975) and Tenopyr (1977) that content validity refers only to content-oriented test development. Guion (1979) asserted that content validity is a special case of construct validity.

Fitzpatrick (1983) reviewed and evaluated the ways in which test specialists have defined content validity. She outlined six areas with which content validity has been associated: 1) the sampling adequacy of test content, 2) the sampling adequacy of test responses, 3) the relevance of test content to a content universe, 4) the relevance of test responses to a behavioral universe, 5) the clarity of content domain definitions, and 6) the technical quality of test items. She suggested that these are definitions of concepts other than content validity, and as no appropriate means of defining content validity can be determined, content validity is "not a useful term for test specialists to retain in their vocabulary" (p.11). However, she suggested no alternative terminology to replace it.

Crocker and Algina (1986) made the point that "content validation is a series of activities that take place after an initial form of the instrument has been developed" (p.218). The most common procedure for establishing content validity is a matching, by expert judges, of test items to the test objectives that make up the test's descriptive scheme.

Several authors have recommended ways to approach this evaluation. Katz (1958) suggested that test objectives be weighted or ranked on importance prior to the matching. Klein and Kosekoff (1975) suggested using a 5-point scale to rate the importance of the test objectives. Authors have also suggested ways to structure the gathering of the matching information, such as having the judges read and respond to each test item before making a rating (Katz, 1958; Ebel, 1956; Klein & Kosecoff, 1975; Hambleton, 1980; and Rovinelli & Hambleton, 1977).

While useful to give an indication of the item-test description match, such procedures do not assure a quality match between the test description and the intended domain. Cronbach's (1971) duplicate construction experiment addressed this issue by comparing the scores on two tests independently developed from the same descriptive scheme. This analysis gives an assessment of the clarity, and thus the reliability, of the test specifications. Correlations between items matched to the same objectives can also be considered, since items measuring the same objective should display at least moderate correlations (Crocker & Algina, 1986). Cronbach (1971) asserted that homogeneous content throughout the test is not evidence of content validity but may, instead, represent oversampling of one area of the domain. However, to assess the degree to which the test measures the intended domain one must look beyond content-related validity to construct- and criterion-related validity.

Construct-Related Validity. In the 1950's, the American Psychological Association Committee on Psychological Tests attempted to specify the qualities of a test that should be investigated before its publication (American Psychological Association, 1954). The explication of the concept of construct validity was cited by Cronbach and Meehl (1955) as the "chief innovation in the committee's report" (p. 281). Since then, the use of construct validity has been addressed by many authors (e.g., American Psychological Association, et al., 1974; Bechtoldt, 1959; Campbell & Fiske, 1959, Loevinger, 1957; Royce, 1963).

An outgrowth of personality testing, construct validity is the process of gathering evidence to support a proposed interpretation of scores on a test. It is most useful and appropriate to investigate construct validity when the interest is in what the test actually measures, rather than its predictive efficiency, and when there is no clear criterion measure with which to compare scores on the test. Without a definite criterion, the investigator must rely on indirect measures (Cronbach & Meehl, 1955). Messick (1975) defines construct validation as the "process of marshaling evidence in the form of theoretically relevant empirical relations to support the inference that an observed response consistency has particular meaning" (p.955). Anastasi (1982) pointed out that construct validity is an accumulation of information from any source that would provide insight into the nature of the construct being measured. She also noted that construct validity is "a comprehensive concept, that includes the other types" of validity (p.153).

Cronbach (1971) gave a rationale for the assertion that content categories, such as those used to develop achievement tests, are almost always constructs, as a content category represents a means of organizing experience. Tenopyr (1977) distinguished construct validity from content validity, asserting that content validity concerns inferences about test content whereas construct validity concerns inferences about test scores. Thus, construct validity is useful in investigating the validity of inferences made from achievement test scores as well as inferences made from measures of personality constructs. However, construct validation has not been common in the assessment of criterion-referenced tests; this is possibly due to the lack of variability often found in criterion-referenced test scores (Hambleton, 1984b).

There is no single way to conduct a construct validity study, nor is there one analysis procedure singularly appropriate to the investigation of construct validity. Construct validity is not reported in the form of a single statistic; it is a judgment based on all of the available evidence. Construct validation begins by stating the intended use of the test scores (Hambleton, 1984b). This "definite statement of proposed interpretation," in conjunction with the exploration of possible counterhypotheses, will suggest what evidence should be collected to support the interpretation (Cronbach, 1971, p. 483).

Several techniques are commonly suggested for use in the analysis of construct validity (Cronbach, 1971; Hambleton, 1984b; Crocker & Algina, 1986). Correlational analyses are used to investigate the association of test scores with variables logically thought to be related. Exploratory factor analysis or confirmatory factor analysis is used to investigate whether the items fit a hypothesized structure. Guttman scalogram analysis has been suggested as a promising method for use when test objectives can be arranged linearly or hierarchically. The multitrait-multimethod approach, developed by Campbell and Fiske (1959), can be used to investigate how much of a measure's variance can be attributed to the trait being measured and how much can be attributed to the method being used to measure the trait. To conduct this analysis it is necessary to have multiple traits (e.g., job knowledge, leadership) measured by the same measure (e.g., a supervisor rating form) and also to have multiple types of measures (e.g., supervisor rating form, self inventory) used to measure each trait. Similarly, Kane (1982) suggested the use of analysis of variance components via the application of generalizability theory to investigate the dependability of test scores across different methods of measurement. The choice of analysis approach depends on logic and, often, on the availability of information.

Criterion-Related Validity. Criterion-related validity is, perhaps, the most straightforward of the validity processes. Investigation of criterion-related validity is intended to assess the "effectiveness of a test in predicting an individual's behavior in specified situations" (Anastasi, 1982, p. 137). A "criterion" performance is used to assess the test's predictive power. For example, job performance might be used as the criterion against which to evaluate an occupational aptitude test, and academic achievement is often used to validate a scholastic aptitude test. Determining a good, reliable, and valid measure of the criterion performance is the most problematic feature of a criterion-related validity study. For example, job performance measures such as supervisor's ratings often reflect more than the individual's job proficiency; they may reflect one's ability to get along with one's boss, which, although important, is not what the aptitude test was intended to predict.

Criterion-related validity can be either concurrent or predictive, depending on the time lapse between test administration and collection of criterion data. Predictive validation is most appropriate in selection and classification situations, such as those found in job hiring and placement or academic selection situations. Concurrent validation is appropriate in situations where the test is intended to perform a diagnostic function, such as assessment of an individual's current psychological state. However, concurrent validation is often used as a substitute for predictive validation when it is inconvenient or impossible to collect data on the criterion performance at a future point in time. In this instance, criterion data currently available are used, or criterion data are collected during the same timeframe in which the test is administered (Anastasi, 1982).

CHAPTER III

STATEMENT OF THE PROBLEM

The development of a test involves theoretical, technical and practical issues. A test typically is designed to measure a construct, whether the construct is achievement, ability, or skills in a particular content domain. Measurement of a construct involves the theoretical issue of how to define the construct. Constructs that are the target of measurement are rarely unidimensional; therefore, it is important to consider how best to define the dimensions making up a construct, such as the skills that make up reading ability.

Theoretical issues mesh with technical and practical issues when one develops a test to measure a construct. Construction of reliable, valid tests involves technical issues (e.g., the proper development of quality test items) as well as practical considerations of test administration (e.g., constraints in testing time). Thus, test development is not merely an exercise in the construction of test items that appear to be related to the target of measurement but, rather, a complex task that involves theoretical, technical, and practical considerations.

One practical consideration that directly affects the operationalization of the construct is test length. If one could measure completely the construct in question, the content of the test could be taken at face value as covering the content domain. The form of the operationalization (i.e., the test format, item types, scoring procedures, etc.) would still be subject to evaluation in terms of its appropriateness to the given content domain; however, content domain representativeness would not be in question as the test content universe would match completely the content domain, and no item sampling would be involved.

Obviously, it is rarely possible to cover the content domain completely except in instances where the content domain is very narrowly defined (e.g., the addition of single-digit numbers) or where the test content universe and the test content sample are fundamentally the same as the content domain (e.g., a probationary period on a job). Therefore, one must often rely on samples of the content domain (and associated test content universe) to represent the total content domain. The strategy used to sample the content domain directly influences the representativeness of the resulting test content sample.

Thus, one of the most critical steps in test construction is the definition and sampling of the content domain. Because this definition of the content domain represents a construct, there is a theory of the construct implied in the definition and in the strategy used to sample from the domain. This is one of the least researched areas of test construction and application.

The initial content theory underlying the development of test specifications is basic to any inferences that are drawn from the test scores. The amount of time, effort, and research that go into developing the theory underlying the test specifications varies widely from situation to situation; little is known about the impact of this initial step on the scores obtained with the measure. It is unknown whether differences in content theory, as reflected in the test specifications, have any real, meaningful impact on the obtained test scores, or whether carefully constructed tests are robust enough to provide meaningful results regardless of variations in the content theory used.

From these issues the question arises: "What effects, if any, do differences in test content theory, as operationalized by the domain definition and sampling, have on the resulting test scores and the inferences that can be made from those scores?" This is a question that has meaning for test developers. The content theory is typically reflected in the weighted test outline. If no real differences are found in the validities of tests based on different content theories, then the test constructor can feel secure that with careful construction the test will provide results relevant to the content domain, regardless of the specific test content theory used. However, if there are real differences in the validities of tests developed using different test content theories, it would point to a need for further research into content theory development and the need for practical guidelines for test developers as to how to develop and test a content theory prior to the construction of test items.

Therefore, this research investigated the effects of different test content theories, as reflected by different test specifications (the content domain definitions and sampling strategies), on the test scores and on the inferences that can be made based on them. In general, it was theorized that tests based on a more detailed theory of the content area, as evidenced by the test specifications (strong theory-based tests), would yield more relevant and desirable results in terms of reliability, content validity and construct validity than would tests based on a less detailed content theory (weak theory-based tests). It was also hypothesized that those differences would become more apparent as the item sample size (test length) became smaller.

Hypotheses

The specific hypotheses, with regard to criterion-referenced tests, were:

1. Strong test content theory provides the structure and guidance to the domain sampling process required to produce multiple forms of a test that are comparable in terms of internal psychometric properties (means and standard deviations), i.e., two forms of a test constructed from strong test content theory-based specifications are more likely to have equal means and variances than are two forms of a test constructed from weak test content theory-based specifications.

2. Alternate forms of the same test developed using strong test content theory-based test construction will be more nearly equivalent, in the context of the classical true score model, than test forms developed using weak test content theory-based test construction procedures. Therefore, the correlation between scores on two forms of a

test (correlation of equivalence) will be higher for strong test content theory-based tests than for weak test content theory-based tests.

3. Test scores are not generalizable (in the context of generalizability theory) across test type (strong test content theory-based vs. weak test content theory-based), i.e., a test developed from strong test content theory-based construction procedures will not yield the same true score for an examinee as will a weak test content theory-based test measuring the same content domain.

4. Strong test content theory-based test construction produces tests with evidence of better content validity than does weak test content theory-based test construction.

5. Strong test content theory-based test construction produces tests with evidence of better construct validity than does weak test content theory-based test construction.

6. As test content sample size decreases, the relative efficacy of strong test content theory-based test construction increases, i.e., differences in reliability and validity become larger.

Definitions

An achievement test is a test that measures the extent to which a person commands a certain body of information or possesses a certain skill, usually in a field where training or instruction has been received.

The content domain is the body of knowledge, skills, and/or abilities identified as the target of measurement. The content domain should be clearly defined so that items of knowledge or particular tasks can be clearly identified as included in or excluded from the domain.

A criterion-referenced test is a test that allows users to estimate the proportion of a specified content domain that an individual has mastered.

A domain score is the expected or true percentage of items in the test content universe that an examinee can answer correctly.

A norm-referenced test is a test for which the score interpretation is based on the comparison of a test taker's performance to the performances of other people in a specified group.

The test content universe is the set of all possible items of acceptable quality, either actual or hypothetical, that could be developed for the content domain.

A test content sample is a sample of items selected from the test content universe to make up one form of the test. Sample selection can consist of direct sampling from an actual test content universe or indirect sampling through selection of a sample of elements from the content domain (knowledges, skills, abilities) and the construction of items to measure those elements.

Test content theory refers to the rationale, or theory, underlying the development of test specifications to guide test construction.

Test specifications typically consist of a content outline that specifies what proportion of the items shall deal with each content area and with each type of skill or ability.

CHAPTER IV

METHOD

In response to the concerns voiced by the National Academy of Sciences (Wigdor & Green, 1986) about the methods used by the Military Services to select the content of the job performance measures used in the Job Performance Measurement Project, development of a comprehensive database for investigation of questions related to test content selection was undertaken. A research team, consisting of the author and a research assistant, worked with subject matter experts to develop a set of test items that, as nearly as possible, covered an entire selected content domain. The item set was then administered to a sample of subjects. The goal was to create a test item universe -- i.e., a set of items covering a defined content domain, from which samples of items and associated responses could be chosen and used to address test content selection issues.

The database was also designed to include data on each examinee on factors related to the content domain. This required the construction and administration of rating forms and the collection of background information. Aptitude test scores and training school grades were also included in the database. Additionally, the sample of examinees was selected so that data from the Job Performance Measurement Project could be integrated into the database. The present study made use of this database, which is described in more detail in the following sections.

A comprehensive job knowledge test, the job knowledge rating forms (self and supervisor), and the Experience and Training Rating Form were developed specifically for use in this study in the winter and spring of 1988. Data were collected using these instruments in the summer and fall of 1988.

The job performance test and job proficiency rating forms were developed as part of the Air Force Job Performance Measurement Project. Data were collected using these instruments in the fall of 1987 and have been reported to Congress. The Job Performance Measurement Project has been documented in technical papers (Hedge & Lipscomb, 1987; Lipscomb & Hedge, 1988). Finally, technical school grades and aptitude test scores are routinely obtained on technical school participants and are available from the technical training centers and personnel files for research purposes.

Selection of a Content Domain

Job knowledge of the first-term (1-48 months of military experience) Aerospace Ground Equipment (AGE) General Mechanic job was chosen as the content domain for the database development for several reasons. The AGE General Mechanic job was in a career field that had been part of the Job Performance Measurement Project and, therefore, recent job performance data were available on some of the personnel in that job. Also, a fairly narrow domain was desirable in order to limit the number of items necessary to cover the domain; the AGE General Mechanic job is relatively narrow in the number and types of tasks performed. To limit the domain further, it was restricted to the work typically performed by first-term airmen in the job. This restricted the content domain to more routine, proceduralized tasks rather than the more complex tasks and supervisory work performed by the senior personnel. Additionally, it was necessary that the chosen job have a sufficient number of people working in it to make data collection feasible, a criterion met by the AGE General Mechanic job. For these reasons, the first-term AGE General Mechanic job was chosen as the job to be used.

It was decided that the testing vehicle would be a multiple choice, paper-and-pencil test for ease of administration of a large number of test items. Job knowledge was selected as a domain parameter because its measurement is a common practice and it is appropriate for the use of a multiple choice paper-and-pencil test format.

Subjects

The subjects were U. S. Air Force enlisted personnel who perform the job of Aerospace Ground Equipment (AGE) General Mechanic. The majority of the subjects were first term airmen with 1-48 months of service; however, the sample also included some enlisted personnel with 4-20 years of experience. Additionally, an effort was made to include in the subject sample individuals who participated in the Job Performance Measurement Project, in which extensive job performance data were collected on these individuals (Hedge & Teachout, 1986). Also participating in the study were subject-matter experts (SMEs) and the supervisors of the study subjects. Demographic information for the total sample and for the Job Performance Measurement Project sample are shown in Tables 1 and 2.

Table 1

Demographic Information for Total Sample

Variable	Mean	SD	Range	N Valid Cases
Age	24.42	4.63	18.75- 41.75	287
Months in career field	49.58	49.99	1.00-239.00	291
Months in service	54.29	50.72	6.00-240.00	291
Skill level*	4.99	1.24	3.00- 7.00	291

Sex: Males = 250 (88.0%); Females = 34 (12.0%); 284 valid cases.

* Skill level reflects level of proficiency. A 3-level is an apprentice, a 5-level is a journeyman, and a 7-level is a master.

N= 294

Table 2

Demographic Information for Job Performance Measurement Sample

Variable	Mean	SD	Range	N Valid Cases
Age	22.76	1.91	19.75-28.25	79
Months in career field	32.84	10.58	17.00-60.00	80
Months in service	36.49	9.92	18.00-64.00	80
Skill level	5.00	0.00	5.00	80

Sex: Males = 67 (85.9%); Females = 11 (14.1%); 78 valid cases.
N= 81

Instruments

Comprehensive Job Knowledge Test. The test was constructed using a listing of each of the 119 tasks routinely performed by AGE General Mechanic first-termers. This listing was taken from the most recent Air Force Occupational Survey Report for the AGE career field, a report of the task-level job analysis conducted on the career field (Christal, 1974). These 119 tasks account for 70% of the time spent by people in that job. Due to time and expense constraints, tasks that were performed by a small percentage of people and that accounted for very little of the time spent on the job were not included in the listing. Thus, the goal of producing a test content universe for the content domain could not be fully realized. However, it was still possible to cover the content domain in a reasonably comprehensive way. The task list was reviewed by subject matter experts (SMEs) for both accuracy and completeness of coverage of the defined content domain. The tasks in the task list are shown in Appendix A.

A detailed task analysis was conducted for each task through which the task was broken down into its component subtasks; subject matter experts defined, for each subtask, the job knowledges required to perform the subtask. Technical orders and job guides were used as reference material. The categories of supporting knowledges outlined in The Task Analysis Handbook (e.g., primary factual knowledge, knowledges prerequisite to skilled performance) (DeVries, Eschenbrenner, & Ruck, 1980) were used as references to identify and define the required knowledges. It should be noted that more than one task required the same knowledges. Appendix A shows the tasks and the associated knowledges identified.

One job knowledge test item was then written for each of the 376 job knowledges identified. Appendix A also shows the number of the test item developed for each knowledge. The task list, job knowledges, and job knowledge test items were extensively reviewed and revised by independent groups of SMEs in workshops at several Air Force bases. The job knowledge test was constructed and then pretested and revised twice. Appendix B contains examples of job knowledge test items.

Job Knowledge Rating Forms. Rating forms were constructed for supervisors to use in rating subjects and for each subject to use in self rating on the subject's degree of job knowledge. To give an overview of the job content domain, eight general areas covering the job were described and a five-point scale was provided on which to make ratings of each area. The eight areas were provided to give the rater a frame of reference and were defined by SMEs using occupational survey report data as reference. The lowest level of knowledge corresponded to "1" on the scale, and "5" represented the highest level. The rating forms were pretested and revised with the job knowledge test. The rating forms are shown in Appendix C.

Experience and Training Rating Form. A form using the eight job areas from the job knowledge rating forms as reference points was constructed to collect ratings from subjects on their overall levels of training and/or levels of experience in their job. A five-point scale was used, with "1" representing a low level of training/experience and "5" representing a high level. The Experience and Training Form was pretested along with the Comprehensive Job Knowledge Test and other rating forms. The Experience and Training Form is also shown in Appendix C.

Job Performance Test and Rating Forms. As a part of the Air Force Job Performance Measurement Project a job performance test and job proficiency rating forms were developed for the AGE career field (Hedge & Lipscomb, 1987; Hedge, Lipscomb, & Teachout, 1988; Lipscomb & Hedge, 1988). The Walk-Through Performance Test, a job performance test, consisted of work sample items that required the hands-on performance of certain specified tasks and interview items that required the examinee to explain, or "talk-through," task performance of certain other tasks. The subject's total score on all the items was his/her Walk-Through Performance Test score.

Also, forms were developed to gather ratings of overall technical proficiency from each examinee's peers and supervisor, and to gather a self-rating from each examinee. A 5-point scale was used, with "5" representing a high level of technical proficiency and "1" representing a low level. Behavioral descriptors were provided for each scalar point on the rating form.

Training Performance and Job Aptitude Measures. Tests administered throughout the 17-week AGE career field technical school were used as measures of training performance. The Mechanical Aptitude Composite of the Armed Services Vocational Aptitude Battery (ASVAB) was used as a measure of aptitude for the job. Also used as aptitude indicators were the 10 ASVAB subtests, the Verbal Composite, the General Composite, the Electronic Composite, and the Armed Forces Qualifying Test Composite.

Data Collection

The 376-item Total Domain Coverage Job Knowledge Test, Job Knowledge Self Rating Form, and Experience and Training Rating Form were administered to 294 AGE personnel from AGE shops at 10 different Air Force bases in the continental United States. Job Knowledge Supervisor's Rating Forms were completed by their supervisors. Three trained test administrators separately visited the 10 Air Force bases and administered the tests to subjects in group testing sessions.

Two test booklets were constructed. Each booklet contained all 376 of the items; the booklets differed only in the ordering of the items. Item order was random within each booklet and different across the two booklets. About half the subjects used one booklet, the other half used the other booklet. Additionally, the test administrators instructed subjects in half of their sessions to complete items 189 through 376 first and complete items 1 through 188 second. These measures were taken to counterbalance any fatigue effects. Test responses and subject background information were recorded by test participants on an optical scan response sheet.

Job Knowledge and Experience and Training Rating Form data were collected from subjects after the Job Knowledge Test was administered. Rating Form responses were recorded by subjects and supervisors in a rating form booklet. Supervisor Rating Forms were distributed by the test administrators and were self-administered.

During the Job Performance Measurement Project data collection, job performance tests were administered to subjects individually by trained test administrators at the subject's work site (Hedge, Lipscomb, & Teachout, 1988). Test administration took approximately 3-4 hours. Self, supervisor, and peer ratings of the subject's overall technical proficiency were collected in group sessions following a rater training session. The rater training session was conducted to train raters to make accurate and unbiased ratings.

Data on subjects' performances in technical school were obtained from the technical school files, and aptitude test scores were obtained from the personnel database. Technical school performance was reflected by the subject's mean test scores throughout technical training for the AGE career field.

Data Analysis

The data described in the previous sections were integrated into a database for use in this study. These data were analyzed to investigate the hypotheses stated in Chapter III. The Comprehensive Job Knowledge Test served as an item pool from which items were selected to create tests that represented the factors used in this study. The two factors in this study were test type, as determined by the test content theory used in test construction, and test length (test content sample size). Differences in test scores that were hypothesized as attributable to these factors were investigated.

Two domain sampling strategies were developed. One strategy reflected a weak test content theory-based approach to test construction. The other strategy represented a strong test content theory-based approach. These two approaches were used to select items from the Comprehensive Job Knowledge Test to create sample tests that served as exemplars of the two approaches to test construction. Because this approach was intended to simulate criterion-referenced test construction, test response characteristics were not used in item selection. This decision was based on the idea that criterion-referenced tests should be developed to represent the content domain and that inclusion or exclusion of items based on item characteristics can distort that representation. Also, in most test construction situations test responses are not available during test construction.

Because the issue of test length was being investigated, tests of various lengths were developed for each test type (strong test content theory-based and weak test content theory-based). Test lengths of 100, 50, 25, 12, and 6 items were used to represent the common range of lengths found in criterion-referenced tests.

After the items to be included in each sample test were identified, each examinee's responses for those test items were extracted from the database to represent how the examinee would have responded to that test. Examinee's percent correct scores based on these responses were computed, giving each examinee a score on each of the different sample tests. These scores simulate what the examinee's performance on the sample tests would have been had he/she been administered each test as a separate entity.

These test scores were analyzed to investigate the six stated hypotheses. The test scores represented tests of various lengths, constructed by two different approaches, designed to measure the same content domain. The six hypotheses and the analyses used to investigate them dealt with the areas of: 1) reliability of test specifications, 2) content-related validity, and 3) construct-related validity. The first three hypotheses dealt with the reliability of test specifications, i.e., do the specifications used to construct the test provide sufficient guidance such that alternate forms of the same test are interchangeable. The fourth hypothesis addressed the issue of content validity, i.e., how representative is the test of the content domain. The fifth hypothesis dealt with construct validity. The sixth hypothesis cut across the three areas by dealing with the impact of test length on each area. A description of the domain sampling strategies employed and a summary of the analyses to address the hypotheses follow.

Domain Sampling Strategies

Weak Test Content Theory-Based Tests. Tests that consisted of a random sample of the Comprehensive Job Knowledge Test items were developed to represent a weak test content theory-based approach to test development. Random sampling of items was attained by use of a random number generator to select the item numbers of items to be included in each sample test. Each sample was an independent sample.

One would expect that, over repeated samplings, the percentage of test items selected from each content area would equal the percentage of test items associated with each content area. That value was calculated for each content area. As previously mentioned, some items reflected knowledges required in more than one content area. Those overlapping test items were counted for each content area they were associated with. Percentage values for each content area were calculated by dividing the number of items associated with the content area (including overlap items) by the total number content area-item associations counted across all content areas (including overlaps) and multiplying by 100. The item sampling pattern that could be expected over repeated instances of random sampling is shown in Table 3.

Table 3

Expected Distribution of Items Across Content Areas

Content area	Percentage of items
1. Maintaining forms, records, and publications	5.32
2. Performing visual and service inspections	7.98
3. Performing periodic inspections	14.64
4. Maintaining AGE electrical and electronic systems	11.60
5. Maintaining AGE engines, motors, and generators	32.13
6. Maintaining AGE hydraulic systems	4.18
7. Maintaining AGE pneumatic systems	5.70
8. Maintaining AGE enclosures, chassis, and drives	12.74
9. Dispatching AGE	5.13
10. Maintaining special tools, shop equipment supplies and facilities	.57

Strong Test Content Theory-Based Tests. The strong test content theory-based approach to test development was a weighted outline process based on, but not identical to, the approach used to select content for measures in the Air Force Job Performance Measurement Project (Lipscomb, 1984; Lipscomb & Dickinson, 1988). The content domain was organized into content areas within which job tasks and associated job knowledges fall, based on occupational analysis information as reported in the most recent occupational survey report for the career field and SME judgment.

Content area weights were developed based on a testing emphasis algorithm that computed the product of task-level SME ratings of training emphasis, occupational survey information on the percent of individuals in the career field performing the task, and the average relative time spent on the task. Expert judgment data were available at the task level on these factors (Christal, 1975; Christal & Weismuller, 1976). The raw weights were summed, and then each raw weight was divided by the total of the raw weights and multiplied by 100 to give a percentage weight for each content area. Items were selected for each sample test using a random stratified procedure reflecting the outline of the content domain and the associated weights. Table 4 shows the content areas, associated weights, and the number of items to be selected for each length test.

A comparison of the values in Tables 3 and 4 indicated that there were differences in the item sampling that would occur with repeated sampling using a weak test content theory-based versus the strong test content theory-based test specifications. Those differences were reflected primarily in three content areas, Areas 3, 4, and 8, on the specifications charts. Other content areas showed smaller differences. Although the overall differences were not extreme, they were sufficient to investigate the sensitivity of test outcome to differences in specifications. Overall similarities in sampling are to be expected between two strategies that reflect the salient features of a content domain. Of course, there is no way to know, a priori, what a single random sampling of test items would look like. Additionally, it was the results of actual tests developed using these two methods that were of primary concern.

Table 4

Strong Test Content Theory-Based Test Specifications

Content area	Percentage weight	Number of test items: Test length 100	50	25	12	6
1. Maintaining forms, records, publications	4	4	2	1	1	1
2. Performing visual and service	7	7	4	2	1	1
3. Performing periodic inspections	4	4	2	1	0	0
4. Maintaining AGE electrical and	17	17	8	4	2	1
5. Maintaining AGE engines, motors, and generators	35	35	17	9	4	2
6. Maintaining AGE hydraulic systems	3	3	2	1	0	0
7. Maintaining AGE pneumatic systems	4	4	2	1	1	0
8. Maintaining AGE enclosures, chassis,	22	22	11	5	3	1
9. Dispatching AGE	3	3	2	1	0	0
10. Maintaining special tools, shop equipment supplies and facilities	1	1	0	0	0	0

Reliability of Test Specifications Analyses

Analyses that focused on the issue of the reliability (or adequacy) of test specifications were concerned with: 1) whether a set of test specifications provide sufficient guidance and structure to the domain sampling process such that two tests developed from the same set of test specifications will provide comparable information, and 2) whether test scores are generalizable across test types. Thus, these analyses investigated whether scores obtained on the different samples of test items are generalizable both within the test type and/or across test types.

To address the first question of the reliability of test specifications, two randomly parallel forms of each test type/test length combination were needed. Because of the breadth of the Comprehensive Job Knowledge Test and the number of items in it, multiple forms of the two test types could be constructed. For each test type, the two forms were analyzed to compare the psychometric properties of the randomly parallel sample tests. Differences in means, standard deviations, homogeneities, and frequency distributions were noted.

To investigate the degree to which tests developed by the same strategy provide the same information (i.e., the same rank ordering of subjects) across varying item sample sizes, intercorrelations of test scores within test construction method were computed. Correlations of equivalence were computed between scores on A and B forms of the same length. This was intended to approximate for each test type Cronbach's (1971) "duplicate experiment" that called for the comparison of forms of a test constructed by independent test developers from the same set of test specifications. The degree of equivalence between forms was seen as a function of the quality of test specifications. The underlying premise of the analysis was that test specifications should be so well-defined that different test developers, using the same set of specifications, will develop equivalent forms.

Analysis of the second question of reliability of test specifications is the issue of the generalizability of scores across test types. Generalizability theory explicitly recognizes the existence of multiple sources of error variance and provides methods for simultaneously estimating each (Kraiger, 1989). Generalizability theory allows the researcher to identify factors affecting measurement (facets) and to estimate the contribution of each factor to total score variance. Generalizability theory analyses (Brennen, 1983; Shavelson, 1986) were conducted to investigate the reliability/generalizability of scores obtained across the different test types and the various test lengths. These analyses investigated whether or not tests yield the same scores for examinees regardless of the test type used to obtain the scores. One of the two randomly parallel forms for each test type/sample size combination that were generated for the previous analyses was selected at random for use in this analysis and the following analyses. Variance components for the person facet, test type facet, and the interaction effects were estimated.

Content-Related Validity Analysis

The content-related validity of the sample tests was investigated. Examinees' scores on the sample tests were correlated with their scores on the total Comprehensive Job Knowledge Test. Scores on the total Comprehensive Job Knowledge Test were used to represent the best estimate of the individual's domain score.

Construct-Related Validity Analyses

Because construct validation is the process of information gathering and hypothesis testing, a series of analyses was conducted. Variables previously demonstrated to be related, or logically assumed to be related, to job knowledge were identified and used in these analyses.

Based on the hypothesis that a job knowledge test score should be related to judgments of an individual's level of knowledge, the correlations of the sample test scores with self and supervisor ratings of job knowledge were computed.

To investigate a model of factors related to job knowledge, a hierarchical regression analysis was conducted for the Comprehensive Job Knowledge Test and for each sample test. No causal relationships between job knowledge and the construct variable were assumed; only the level of association was investigated. Data for the regression analysis were available on a subset of the subject sample, those who participated earlier in the Air Force Job Performance Measurement Project. The construct variables reflected the hypothesis that job knowledge is related to individual aptitude for the job, training and experience on the job, and job performance. Additionally, correlations of scores on the tests with a variety of aptitude indices were investigated.

Finally, it was assumed that job knowledge increases with job experience. Therefore, a comparison was made between scores of novices (1-24 months on the job) and experts (over 7 years on the job) on the Comprehensive Job Knowledge Test and on each of the sample tests.

CHAPTER V

RESULTS

Reliability of Test Specifications

As previously described, a series of analyses were conducted to address the first three hypotheses that dealt with the question of the reliability of the test specifications. Two randomly parallel forms were generated for each item sample size of each test type, creating a Form A and Form B for each sample size of each test type. Test scores (percent correct) were computed for each subject on each of the 10 sample tests and the Total Test. Tests representing weak test content theory-based construction are coded as TR (for random design test) in the following tables. Tests representing strong test content theory-based construction are labelled TJ (for judgment design test). The Comprehensive Job Knowledge Test is labelled Total Test.

Hypothesis One dealt with the stability of test psychometric properties across different forms of the same test. Table 5 shows the means and standard deviations of each sample test. Tests of differences between correlated pairs of means were conducted between test forms. It was expected that strong test content theory tests (TJ) would display less variation in means between A and B forms than would weak test content theory tests (TR). Differences between A and B forms were significant for all pairs of tests across both test types, with the exception of the TR25 tests. With the exception of the TR100 test, the differences between form means for the TR tests were smaller in magnitude than the differences between form means for the TJ tests. Thus, these results do not support Hypothesis One.

In the context of Hypothesis One, it was expected that there would be less variation between forms in the properties of internal consistency, skewness, kurtosis, and range for tests constructed using strong test content theory than for tests constructed using weak test content theory. Visual inspection of Table 6 showed no systematic difference between test types in the agreement between A and B forms in internal consistency or in test score distribution indices. Internal consistency was moderately high in the 100 item test of both types, comparing favorably with the internal consistency of the Total Test. As expected, internal consistency was reduced as the test length decreased. However, the data do not suggest that the TJ tests were more reliable across forms in terms of internal psychometric properties than the TR tests. Therefore, Hypothesis One was not supported by these data.

Table 5

Psychometric Properties of Randomly Parallel Sample Tests and Total Test - Means and Standard Deviations

	Form A		Form B		
Test type	Mean	SD	Mean	SD	t
TR100	74.51	9.14	71.31	10.02	12.74*
TR50	75.52	11.04	72.33	10.83	7.29*
TR25	68.68	10.26	70.38	12.35	-2.65
TR12	66.13	15.59	70.55	15.30	-4.74*
TR6	82.60	18.38	76.13	17.74	5.12*
TJ100	71.02	9.54	72.52	9.48	-5.28*
TJ50	71.37	10.00	67.80	9.76	8.17*
TJ25	75.10	11.31	79.85	11.02	-8.47*
TJ12	72.05	14.98	64.14	14.89	8.80*
TJ6	81.01	17.12	67.91	19.92	9.98*
Total Test	71.78	8.93			

Note. TR=Random design test; TJ=Judgment design test. N= 294 .
*p=<.001

The data shown in Tables 7 and 8 address the second hypothesis, which held that tests developed using strong test content theory would be more nearly equivalent across forms than tests developed using weak test content theory. Shown are the intercorrelations of test scores for both the TR and the TJ sample tests. Correlations of equivalence were computed between forms of the tests. Additionally, all scores within test type were intercorrelated to assess the level of agreement between the various form/length combinations for a test type. It was expected that the TJ tests would show higher positive correlations of equivalence and higher intercorrelations overall. Comparison of the correlations of equivalence shown for the TR tests and those shown for the TJ tests indicate a high degree of similarity in magnitude and pattern. A and B forms of the 100-item tests of both types were highly correlated, indicating that the two test forms were rank ordering subjects much the same. As was to be expected, for both test types correlations between A and B test forms decreased in magnitude as test length decreased. In general, correlations between sample tests of the same test type were moderate, ranging from .28 to .90 for the TR tests and from .27 to .87 for the TJ tests. Thus, no consistent differences were observed in the magnitudes or patterns of correlations when the values in Tables 7 and 8 were compared. Therefore, TJ tests did not show more agreement across test forms and lengths, and Hypothesis Two was not supported.

Table 6

Psychometric Properties of Randomly Parallel Sample Tests and Total Test - Alpha, Skewness, Kurtosis, and Range

	Alpha		Skewness		Kurtosis		Range	
	Form		Form		Form		Form	
Test	A	B	A	B	A	B	A	B
TR100	.83	.84	-.42	-.46	-.19	-.13	47.00- 94.00	41.00- 92.00
TR50	.75	.72	-.54	-.78	-.08	.90	40.00- 98.00	34.00- 96.00
TR25	.39	.57	-.46	-.47	.06	.24	36.00- 88.00	24.00- 96.00
TR12	.40	.38	-.39	-.36	-.12	.09	16.67-100.00	16.67-100.00
TR6	.36	.24	-1.03	-.45	.65	-.02	16.67-100.00	16.67-100.00
TJ100	.82	.83	-.44	-.26	.04	-.39	40.00- 92.00	46.00- 92.00
TJ50	.67	.67	-.23	-.54	-.03	.16	40.00- 96.00	42.00- 90.00
TJ25	.54	.53	-.46	-.64	-.27	.16	44.00- 96.00	44.00-100.00
TJ12	.43	.40	-.46	-.50	.12	.34	16.67-100.00	16.67-100.00
TJ6	.24	.33	-.61	-.48	-.51	-.20	33.33-100.00	16.67-100.00
Total Test	.95		-.51		.06		43.09-91.22	

Note. TR=Random design test; TJ=Judgment design test. N= 294.

Using the A forms, a generalizability theory analysis was conducted to investigate the reliability/generalizability of scores obtained across the different test types and various test lengths, as addressed in Hypothesis Three. As shown in Table 9, variance components were estimated for the person facet, test type facet, test length facet, and the interaction effects. Variance component values of (0.0) are shown in the table indicating that estimated variance components for those factors were negative even though, by definition, variance components are nonnegative (Brennan, 1983). This result is not uncommon with small sample sizes due to sampling variability. The negative value was replaced with 0.0 to avoid biasing other variance components.

Table 7

Intercorrelations of Weak Test Content Theory-Based Sample Tests

Test	TR 100A	TR 50A	TR 25A	TR 12A	TR 6A	TR 100B	TR 50B	TR 25B	TR 12B	TR 6B
TR100A										
TR50A	.85									
TR25A	.68	.65								
TR12A	.64	.59	.46							
TR6A	.54	.53	.38	.34						
TR100B	.90	.90	.68	.62	.50					
TR50B	.82	.76	.58	.57	.50	.82				
TR25B	.75	.69	.54	.57	.41	.72	.68			
TR12B	.65	.57	.43	.46	.35	.64	.57	.48		
TR6B	.52	.49	.40	.37	.28	.50	.46	.44	.37	

Note. Correlations of equivalence are underlined.
All correlations significant at (p<.001) level.
N= 294.

Table 8

Intercorrelations of Strong Test Content Theory-Based Sample Tests

Test	TJ 100A	TJ 50A	TJ 25A	TJ 12A	TJ 6A	TJ 100B	TJ 50B	TJ 25B	TJ 12B	TJ 6B
TJ100A										
TJ50A	.84									
TJ25A	.73	.71								
TJ12A	.61	.53	.52							
TJ6A	.48	.41	.32	.35						
TJ100B	.87	.82	.73	.64	.47					
TJ50B	.80	.71	.73	.58	.44	.78				
TJ25B	.73	.69	.63	.52	.47	.75	.70			
TJ12B	.61	.59	.55	.47	.37	.66	.60	.61		
TJ6B	.57	.56	.50	.40	.27	.56	.50	.43	.40	

Note. Correlations of equivalence are underlined.
All correlations significant at p<.001 level.
N= 294.

In the context of Hypothesis Three, it was expected that there would be a relatively large variance component associated with test type, which would indicate that test scores cannot be generalized across test types. Comparison of the relative contributions of the estimated variance components to the total variance indicated that the undifferentiated error factor (ptl) accounted for the most variance. The person factor was the next largest source of variance; this variance is desirable, as it indicates that individual differences in test responses had a strong influence on test scores. Test length had the next largest, though relatively small, variance component, indicating that the length of the test affected the reliability of the test scores and that test scores from one length test are not generalizable to another length test. The zero value for the test type variance component indicated that test type did not contribute to the systematic variance in test scores; thus, it made little difference which test type scores were associated with. There was a relatively small variance component associated with the tl interaction, indicating that test length affects scores differently depending on the type of test, but not so as to be a major source of variance. No measurable variance component was associated with the pl interaction, and very little was associated with the pt interaction. Thus, the results of the generalizability analysis indicated that test scores are generalizable across test type, not supporting Hypothesis Three.

Table 9

Estimated Variance Components for G-Study with Two Test Types and Five Item Sample Sizes

Effect	df	MS
Person (p)	293	80.39
Test type (t)	1	(0.0)
Test length (l)	4	16.12
pt	293	1.84
pl	1172	(0.0)
tl	4	12.97
ptl	1172	91.42

N= 294

Content-Related Validity

Hypothesis Four held that strong test content theory-based test construction would produce tests with evidence of better content validity than would weak test content theory-based test construction. Total test scores were used as the best representation of the true domain score. To investigate how closely the sample tests approximated the Total Test in the assessment of individuals, Form A tests of both types were correlated with the Total Test. As shown in Table 10, no significant differences (p<.001) were found between the TR and TJ correlations with the Total Test.

Table 10

Zero-Order Correlations of Sample Tests with Total Test Score

	Test Type		
Test length	TR	TJ	Hotelling's t
100	.94	.93	1.19
50	.88	.86	.85
25	.71	.77	-2.14
12	.67	.66	.18
6	.53	.50	.61

Note. p<.001 for all correlations; t value required for significance at p<.001 = 3.30 for differences between correlations .
N = 294

As was to be expected, correlations decreased as test length decreased. Correlations were moderate to high for both the TR tests and TJ tests. Correlations of this magnitude were not unexpected, as these are part-whole correlations. These correlations suggest that a sample of 100 items from the Total Test gives a good representation of the Total Test regardless of which sampling method is used. These correlations also reflect the reduction in agreement between the sample tests and the Total Test as the number of items decreases. However, even with as few as 6 items, a moderate correlation between sample and Total Test was achieved in both test types. Based on these results Hypothesis Four was not supported.

Construct Validation

In order to investigate the construct validity of the sample tests, as addressed by Hypothesis Five, variables hypothesized to be related to an individual's level of job knowledge were identified and data were collected on those variables. Table 11 lists those variables and descriptive statistics for each. An intercorrelation matrix of all variables used in the construct validation study is given in Appendix D.

Table 12 shows the correlations of the Total Test and each of the sample tests with self ratings of job knowledge and supervisor ratings of job knowledge. It was expected that TJ tests would have higher positive correlations with the self and supervisors' ratings of job knowledge than would the TR tests. Correlations ranged from fairly low to moderate. All correlations were significant ($p<.001$). As was to be expected, correlations decreased in magnitude as test length decreased. However, no significant differences ($p<.001$) were found between test types in correlations with self or supervisor's ratings. For both test types, test correlations were, in general, slightly higher with self ratings than with supervisor ratings.

Table 11

Means, Standard Deviations and Range of Construct Validation Measures

Construct variable	Mean	SD	Range	N
Job knowledge ratings-self	3.53	.61	2.00-5.00	293
Job knowledge ratings-supervisor	3.60	.88	1.00-5.00	294
Experience/training ratings	3.44	.66	1.75-5.00	292
Technical training grade	89.04	4.74	76.00-98.00	79
Job performance score	143.55	23.00	97.01-222.79	81
Performance rating-supervisor	3.68	.63	2.10-4.87	80
Performance rating-self	3.75	.61	2.41-5.00	80
Performance rating-peer	3.66	.47	2.71-4.68	80
General science	53.45	6.15	39-66	69
Arithmetic reasoning	52.58	6.17	41-66	69
Work knowledge	52.26	4.86	42-61	69
Paragraph comprehension	52.51	5.90	32-61	69
Numerical operations	51.61	6.62	35-62	69
Coding speed	51.42	6.16	35-64	69
Auto/shop information	58.12	6.30	44-69	69
Math knowledge	52.43	7.40	38-68	69
Mechanical comprehension	56.75	5.59	41-67	69
Electronic information	54.43	8.07	37-70	69
Verbal composite	52.49	4.52	42-62	69
Mechanical composite	226.43	18.28	175-265	69
Administrative composite	155.52	11.80	131-178	69
General composite	105.07	8.16	92-128	69
Electronic composite	212.90	18.26	184-253	69
Air Force Qualifying Test	78.80	7.30	67.0-98.5	69

Table 12

Correlations of Total Domain Test and Sample Tests with Self and Supervisor's Ratings of Job Knowledge

	Self ratings			Supervisor ratings		
Test length	TR	TJ	t	TR	TJ	t
100	.45	.41	1.42	.40	.39	.31
50	.46	.42	.93	.32	.37	-1.32
25	.38	.36	.32	.29	.33	-.88
12	.30	.34	-.67	.24	.31	-1.09
6	.29	.30	-.13	.24	.33	-1.35
Total test	.48			.44		

Note. $p<.001$ for all correlations; t values are for Hotelling's t-tests with $df=291$.
No t values reached significance $p<.001$.
$N= 293$ for correlations with Self Ratings;
$N= 294$ for correlations with Supervisor Ratings.

A conceptual model of factors hypothesized to be related to job knowledge was developed. The model specified variables thought to be associated with job knowledge. The model was analyzed via hierarchical regression analysis. Variables were entered into the regression equation in the order of the hypothesized strength of association, as shown in Table 13. Those variables thought to be most highly associated were entered into the equation first. The relationship of each sample test and the Total Test to these variables was analyzed using this model. Scores on the Mechanical Composite of the ASVAB were used to represent aptitude. The final R^2 for each model was computed to assess the association of each test score with a weighted linear composite of the construct validation model variables. In the context of Hypothesis Five, it was expected that the TJ tests would show a stronger association with the construct variables, i.e., a higher squared multiple correlation coefficient (R^2) for the TJ regression equations.

As shown in Table 13, only the Total Test and the TJ100 test showed significant associations with the weighted linear composite of the construct variables used in this analysis, as indicated by the squared multiple correlation coefficients. No difference in pattern of association, i.e., R at each step, was apparent between the test types. It can be noted that the squared multiple correlation coefficient for each TJ test equation is greater in magnitude than for the same length TR test equation. However, because the differences between the TR and TJ tests, in their association with the construct variables, are so small, the results of this analysis do not suggest any meaningful differences between test types.

Table 13

Hierarchical Regression Results for Total Test and Sample Tests

Variables (listed in order of entry into regression equation)	Total test R	TR 100 R	TR 50 R	TR 25 R	TR 12 R	TR 6 R	TJ 100 R	TJ 50 R	TJ 25 R	TJ 12 R	TJ 6 R
1. Training	.23	.24	.18	.21	.11	.05	.26	.22	.06	.11	.06
2. Aptitude	.48	.48	.36	.32	.28	.11	.52	.40	.33	.31	.21
3. Experience/ training	.48	.48	.39	.32	.28	.15	.52	.44	.34	.31	.28
4. Job performance score	.53	.52	.43	.35	.31	.19	.55	.46	.40	.43	.28
5. Supervisor's performance rating	.54	.52	.44	.38	.31	.19	.55	.47	.43	.44	.33
6. Self performance rating	.58	.54	.48	.38	.36	.26	.57	.49	.50	.45	.36
7. Peer performance rating	.60	.56	.49	.40	.38	.26	.60	.51	.50	.49	.37
R	.36*	.31	.24	.16	.14	.07	.36*	.26	.25	.24	.14

N=69
*p<.001.

Also, to assess the relative construct validity of the tests, test scores were correlated with aptitude indicators, as shown in Table 14. It was expected that the Total Test and sample tests would correlate with the mechanical aptitude indicators and not correlate with tests of other aptitude areas. Significant correlations (p<.001) were seen for the Total Test and the 100-item tests of both types with the mechanical aptitude indicators. TJ100 correlations with mechanical aptitude indicators were slightly higher than the TR100 correlations with mechanical aptitude indicators. However, these differences were not significant (p<.001). Shorter length tests of either type did not correlate at a significant level with any of the mechanical indices. With the exception of a significant correlation between TR12 and coding speed, no significant correlations were seen with aptitude indicators not related to mechanical aptitude.

As a final investigation of construct validity, the sensitivity of the Total Test and sample tests to detect differences between novices and masters in test performance was assessed. It was expected that the TJ tests would be more sensitive to differences between novices and masters in job knowledge. As shown in Table 15, there were significant differences between novices and masters on all tests. Longer tests appeared to be more effective in assessing differences than shorter tests for both test types. It was noted that the differences for the TJ test were slightly greater, overall, than those for the TR tests, suggesting that the TJ tests may be more sensitive to differences between masters and novices.

Table 14

Correlations of Total Domain Test and Sample Tests with Aptitude Indicators

Aptitude indicator	Total test	TR 100	TR 50	TR 25	TR 12	TR 6	TJ 100	TJ 50	TJ 25	TJ 12	TJ 6
General science	.16	.14	.06	.16	-.01	.06	.15	.06	.10	.16	-.16
Arithmetic reasoning	.15	.13	.13	.12	.16	-.01	.11	.02	.16	-.03	.14
Word knowledge	.18	.19	.07	.10	.02	.13	.23	.00	.05	-.02	-.06
Paragraph comprehension	.27	.28	.20	.11	.24	.18	.23	.21	.11	.05	.03
Numerical operations	.02	.10	.17	.06	.20	-.12	.04	.11	-.01	.10	.28
Coding speed	.24	.34	.32	.16	.42*	.11	.24	.28	.14	.30	.30
Auto/shop information	.45*	.43*$_a$	.35	.26	.21	.16	.45*$_a$	.38	.35	.26	.23
Math knowledge	.12	.11	.13	.23	.07	.02	.11	-.02	.05	.10	.13
Mechanical comprehension	.39*	.40*$_b$	.34	.26	.31	-.02	.46*$_b$	.29	.22	.34	.24
Electronic information	.28	.30	.24	.31	.03	.16	.35	.17	.19	.22	.16
Verbal composite	.24	.26	.13	.12	.11	.17	.26	.09	.07	.01	-.03
Mechanical composite	.48*	.47*$_c$	.36	.31	.24	.12	.50*$_c$	.37	.34	.34	.18
Administrative composite	.23	.33	.31	.16	.37	.06	.24	.25	.09	.22	.30
General composite	.24	.24	.17	.15	.18	.09	.22	.06	.16	-.02	.09
Electronic composite	.27	.27	.22	.32	.09	.09	.29	.09	.19	.19	.12
Armed Forces Qualifying Test	.29	.31	.26	.18	.27	.07	.27	.13	.16	.05	.20

Note. Mechanical Aptitude Indices are underlined. N=69.
Correlations having the same subscript were compared and are not significantly different at p<.001.
*p<.001

Table 15

Mean Scores and Standard Deviations of Novices and Masters on Total Test and Sample Tests

Test	Novices Mean	Novices SD	Masters Mean	Masters SD	t
Total	66.69	8.00	79.60	6.75	-10.00*
TR100	69.74	8.09	81.74	7.93	-8.83*
TR50	70.49	10.32	84.04	8.02	-8.29*
TR25	63.71	9.20	75.06	6.86	-7.86*
TR12	60.81	15.02	72.88	14.89	-4.76*
TR6	77.78	19.89	90.52	13.02	-4.18*
TJ100	66.31	8.25	79.04	7.63	-9.33*
TJ50	66.32	8.95	80.00	8.41	-9.21*
TJ25	69.62	10.49	82.74	9.24	-7.67*
TJ12	65.62	15.33	82.03	12.06	-6.74*
TJ6	74.47	17.38	92.16	10.73	-6.70*

Note. Novices=1-24 months in career field (N=111). Masters = 84 months or more in career field (N=51).
*p<.001

Overall, the analyses to investigate the construct validity of the sample tests provided very little support for the fifth hypothesis. The comparison of the differences between means for masters and novices means on the two test types suggested that the TJ tests might be more sensitive to differences between those two groups. However, all the novices-masters differences were significant for both test types, and the difference between test types was small. Also, the regression analysis suggested that the TJ tests had a slightly stronger association with the set of construct validation variables. Again, because these differences were so slight, little meaning can be attached to them.

The last hypothesis, Hypothesis Six, proposed that test type differences in reliability of test specifications, content validation, and construct validation would increase as test length decreased. As no meaningful differences between test types were found in any of the areas investigated, Hypothesis Six could not be supported. However, as would be expected, overall reductions in indices of test quality across the three areas of investigation were seen as test length decreased.

CHAPTER VI

DISCUSSION

This study was intended to address issues that arise when a test developer is required to construct a test that cannot completely cover the content domain due to test administration constraints, such as testing time. In this common situation, the test developer must rely on a sample from the content domain to represent the total content domain. Underlying the sampling of the content domain is a test content theory, either implicitly or explicitly defined. An implicit test content theory can be seen as a weak test content theory, in which the underlying test content theory is not given much emphasis. An explicitly defined theory can be categorized as a strong test content theory. The question arises as to how well the sample, selected as a result of the underlying theory, represents the content domain.

Six hypotheses were investigated in this study. The proposition underlying each of the hypotheses was that strong test content theory provides better definition and structure to test development and that this structure and definition is needed to produce a quality test. Thus, it was hypothesized that strong test content theory, as reflected in the test specifications, would produce a higher quality test than one developed using a weak test content theory.

The hypotheses investigated in this study dealt with three general areas. Hypotheses One, Two and Three dealt with the reliability of test specifications. Hypothesis Four dealt with content validity, and Hypothesis Five dealt with construct validity. Hypothesis Six dealt with the interaction of test length with the effects of test content theory across the three general areas.

Hypothesis One posited that alternate forms of a test developed using strong test content theory would be more comparable in terms of internal psychometric properties than would alternate forms of a test developed using weak test content theory. This hypothesis was not supported. No systematic differences were seen in the comparability between alternate forms of tests developed using weak test content theory (WTCT) versus tests developed according to strong test content theory (STCT).

Hypothesis Two held that alternate forms of STCT tests would be more nearly equivalent than alternate forms of WTCT tests. The analysis to investigate this was an attempt to approximate, for each test type, the "duplicate experiment" called for by Cronbach (1971) to investigate rigorously the match between the operational definition used to construct the test and the actual test operations, and to compare the results for the two test types. No difference between test types was seen in correlations of equivalence. Therefore, this hypothesis was not supported. A large variation in the degree of equivalence between test forms was seen, with correlations of equivalence ranging from .28 to.90 for the weak test content theory tests and from .27 to .87 for the strong test content theory tests. The degree of equivalence seen appeared to be a function of test length, with the highest degree of equivalence seen between the 100-item tests.

It is of interest to note that Ebel's (1962) comparison of test forms developed by two independent test developers, each using the same set of specifications, found a similar level of intercorrelation between test forms (r=.92) as observed in this study (r=.90 for TR100 and r=.87 for TJ100). The content domain of Ebel's test was word knowledge. The test specifications reflected a spaced sampling of 100 words from a specified dictionary. Ebel concluded that, based on the sampling fluctuations seen in the scores, tests of many more than 100 items would be needed to yield equivalent scores from alternate forms. Thus, it would appear that larger samples of the domain or more precise test specifications are needed to assure equivalent forms when item selection is based on test specifications alone, without the use of item analysis information.

Hypothesis Three stated that test scores are not generalizable across test type (WTCT versus STCT) in the context of generalizability theory. Generalizability theory analysis found that no systematic variance in scores was associated with test type. Thus, this hypothesis was not supported.

Hypothesis Four proposed that STCT tests would exhibit evidence of better test content validity than would WTCT tests. No differences between test types were seen in correlations with the Comprehensive Job Knowledge Test scores. Therefore, Hypothesis Four was not supported.

Hypothesis Five proposed that STCT theory tests would exhibit stronger evidence of construct validity than would WTCT tests. A series of analyses comparing evidence of the construct validity of tests developed by using a strong test content theory and tests developed by using a weak test content theory provided no meaningful support for this hypothesis. The STCT tests appeared to be somewhat more sensitive to differences between masters and novices, and slight, but consistent, differences between test types were seen in the association of test scores with the construct validation variables; however, the magnitudes of the differences were not large enough to be considered meaningful.

Finally, Hypothesis Six proposed that differences in test quality between STCT tests and WTCT tests would increase as test content sample size (i.e., number of test items) decreased. As no meaningful differences were found between test types, this hypothesis was not supported. As would be expected, both test reliability and validity decreased as test length decreased across both test types; this general effect has been well-documented in both theory and previous research.

Thus, the hypothesized differences in test quality between STCT tests and WTCT tests were not found in this study. However, as this study is the only study to date making this comparison and only two sets of test specifications were compared, it would be premature to conclude at this time that there are no differences in the characteristics of tests developed using a weak test content theory versus and strong test content theory. As noted earlier, little empirical research has been conducted in this area. Thus, there is no body of literature into which to integrate these results and with which to make comparisons. In assessing the meaning of these results of this study, several issues should be considered.

First, the test specifications that represented strong test content theory in this study were not dramatically different from what would be expected over repeated random sampling. This was not unexpected as the strong test content theory test specifications were designed to reflect the salient features of the content domain. Although differences were seen in emphasis on certain areas of the content domain, the differences were not dramatic. Thus, an alternate conclusion might be that test results are not sensitive to slight-to-moderate variations in test specifications that result from different test construction theories. No conclusions can be drawn as to the impact of dramatically different test specifications, as might be appropriate in other domains or for tests for other purposes.

Also, it should be noted that the specification of the content domain underlying the test development for both types of tests was very thorough and subject to the judgment of subject matter experts as to what was included. Thus, although efforts were taken to include all elements of the content domain, there was little included in the content domain, as it was defined, that could be considered trivial or irrelevant. Therefore, it could be concluded that, given a well-defined test content domain, relatively small differences in test construction specifications have no significant impact on the resulting test score characteristics.

Finally, the importance of test length should be noted. The 100-item test of both types exhibited reliability of test specifications, content validity and construct validity very close to that of the Total Comprehensive Job Knowledge Test. Decreases in overall test quality were seen as test length was reduced. Of course, test length decisions should be made in the context of the breadth of the content domain being sampled and intended use of the test scores.

The results of this study point to the need for further research in this area beyond the scope of this investigation. Alternate sampling plans emphasizing other relevant features of the content domain should be investigated. It is possible that the content theory developed for use in this study was not the best one to represent the content domain. There may exist important features of the content domain that were not emphasized in the strong test content theory strategy. Also, the overlap in job knowledges across content areas that was seen in this study suggests that research into the usefulness of general knowledge testing would be of interest. Perhaps atest that focuses on the common knowledges would provide information more relevant to job performance than would a test that samples a broader range of job knowledge. This, again, would reflect an alternate theory of job knowledge.

Different and more precise approaches to test content specification, such as facet theory, should be investigated. The best match between test construction approach and domain characteristics needs to be investigated and established.

Also beyond the scope of this study, but worthy of investigation, is the issue of the impact of underlying test theory on mastery decisions, such as those required in certification tests. The differences seen in scores of novices and masters on the STCT tests compared to the WTCT tests suggest that this is an area where test content theory may play a stronger role. Again, the intended use of the test scores should be a determining factor in the approach taken to the construction of a test.

The iterative nature of test construction has been emphasized by Millman and Greene (1989). The results of this study should be seen in the light of this idea. Although test items were pretested and revised, the test specifications were not. The iterative nature and steps for test refinement are well documented for normative test construction. However, it may be that test specifications should be subject to pretest and refinement as well.

The aim of this study was to investigate issues that have practical applications in test development. The results of this study suggest that, given a well defined domain and careful item development, differences in test content theory such as those seen in this study may not result in test scores with significant differences in psychometric properties. Adequate test length is required if the measurement instrument is to demonstrate reliability and validity. However, results of this study should be interpreted cautiously and should not be generalized to domains significantly different from the one used in this study. It should be remembered that the content domain used was fairly homogeneous, was of low-to-moderate difficulty level, and contained no special requirements, such as safety certification. Other domains may require testing more suited to the characteristics of the specific domain. Additionally, although slight differences in test specifications may have little impact on the test results, it is still the responsibility of the test developer to consider the issue of test content theory in test development and to have a defensible rationale for the approach taken.

Concerns about the quality of measurement instruments are not confined to those in the testing field. A recent national news article (Leslie & Wingert, 1990) cited the question "How do you measure success - against what test?" as the question for the 1990s in education. Discussing the role of testing in the American educational system, the authors concluded that we need new tests to help us produce students who know how to think. Parents, politicians, and employers were cited as sources of the push for tests that measure the right skills and supplement, rather than distort, classroom instruction. The trend toward standardized performance-based testing that includes real-life tasks and makes use of essay questions was cited. These issues and trends make the issue of test development methods, in general, and test content theory, specifically, all the more relevant and the need for continued research more critical.

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APPENDIX A

FIRST-TERM AEROSPACE GROUND EQUIPMENT (AGE)

GENERAL MECHANIC TASKS AND ASSOCIATED JOB KNOWLEDGES

SELECTED TASKS WITH ASSOCIATED ITEM NUMBERS AND CORRESPONDING JOB KNOWLEDGES

Task 154 Perform aircraft support generator visual or service inspections

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ITEM NUMBER	KNOWLEDGE MEASURED
62.	Procedure for checking equipment forms.
110.	Method for checking fuel level.
120.	Inspection of the air inlet screen.
136.	Method for checking the emergency shut down lever.
185.	Service inspection on an A/M32A-86 generator.
186.	Method for reading the service indicator.
213.	Inspection of cables on a generator set.
245.	Procedure for checking the parking brake.
252.	Interpretation of an oil dip stick reading.
263.	Deflection allowed in drive belts.
302.	Identification of gages needing immediate replacement.
340.	Procedure for checking protective tray lamps.

Task 173 Perform aircraft support generator periodic inspections

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ITEM NUMBER	KNOWLEDGE MEASURED
12.	Identify the draw bar or tow bar.
54.	Procedure for packing wheel bearings.
62.	Procedure for checking equipment forms.
109.	Required times for disconnecting battery.
116.	Inspection of a control panel.
120.	Inspection of the air inlet screen.
129.	Periodic inspection on an engine crank case.
145.	Inspection of the governor accuator linkage.
155.	Periodic inspection on fuel lines.
158.	Method for straightening bent doors.
177.	Periodic inspection on the external power receptacles of an aircraft support generator.
186.	Method for reading the service indicator.
207.	Procedure for removal of a fan belt.
208.	Service inspection of a gas turbine compressor.
213.	Inspection of cables on a generator set.
214.	Identify the AFTO number for the Equipment Status form.
221.	Procedure for cleaning bearings.
244.	Drying and inspection procedures for bearings.
245.	Procedure for checking the parking brake.
278.	Periodic inspection of coolant hoses, lines, and fittings.
340.	Procedure for checking protective tray lamps.
354.	Reason for checking the butterfly valve of the generator.

Task 444 Build bleed air hoses

ITEM NUMBER	KNOWLEDGE MEASURED
34.	Use for various lockwiring (safety wiring) methods.
109.	Required times for disconnecting battery.
174.	Position of clamps on a bleed air hose.
281.	Define scuff cover.
295.	[illegible] of a torque wrench.

Task 247 Adjust magneto or distributor points

ITEM NUMBER	KNOWLEDGE MEASURED
183.	Location of breaker points.
217.	Identify components inside of an ignition breaker assembly.

Task 259 Clean magneto or distributor points

ITEM NUMBER	KNOWLEDGE MEASURED
17.	Procedure for cleaning contactors.
93.	Define PSI.
205.	Appropriate use of compressed air.
217.	Identify components inside of an ignition breaker assembly.
233.	What PSI symbolizes.
291.	Define what a magneto supplies.
300.	Requirements for wearing protective gear.
356.	Procedure for cleaning contactor points.
369.	Procedure for cleaning magneto.

Task 330 Time distributors

ITEM NUMBER	KNOWLEDGE MEASURED
123.	Define firing order.
132.	Methods for checking ignition timing.
141.	Define number 1 cylinder.
161.	Point gap for an NF-2 light cart.
217.	Identify components inside of an ignition breaker assembly.
223.	Define gap.
226.	Define top dead center.
283.	Define compression stroke.
305.	Use of a stroboscope.
368.	Meaning of impulse coupling snapping.

Task 200 Clean load contactors

ITEM NUMBER	KNOWLEDGE MEASURED
17.	Procedure for cleaning contactors.
109.	Required times for disconnecting battery.
356.	Procedure for cleaning contactor points.

Task 197 Clean contactor points

ITEM NUMBER	KNOWLEDGE MEASURED
17.	Procedure for cleaning contactors.
109.	Required times for disconnecting battery.
356.	Procedure for cleaning contactor points.

Task 290 Remove or install engine magnetos or distributors

ITEM NUMBER	KNOWLEDGE MEASURED
58.	Identify the tool used for removal of magneto ignition leads.
132.	Methods for checking ignition timing.
216.	When grounding a unit is necessary.
217.	Identify components inside of an ignition breaker assembly.
226.	Define top dead center.
291.	Define what a magneto supplies.

Task 331 Time engine magnetos

ITEM NUMBER	KNOWLEDGE MEASURED
84.	Procedure for setting engine timing with the flywheel.
123.	Define firing order.
132.	Methods for checking ignition timing.
141.	Define number 1 cylinder.
144.	Identify meter which measures current flow.
216.	When grounding a unit is necessary.
226.	Define top dead center.
247.	Identify the crankshaft.
283.	Define compression stroke
286.	Location of the flywheel.
291.	Define what a magneto supplies.
305.	Use of a stroboscope.
368.	Meaning of impulse coupling snapping.

Task 190 Adjust contactor points

ITEM NUMBER	KNOWLEDGE MEASURED
60.	Use of feeler gage.
109.	Required times for disconnecting battery.
226.	Define top dead center.
348.	Procedure for adjusting breaker points.

Task 257 Clean and adjust spark plugs

ITEM NUMBER	KNOWLEDGE MEASURED
60.	Use of feeler gauge.
157.	Procedure for checking spark plug gap on an NF-2 light cart.
223.	Define gap.
259.	Inspection of spark plugs for irregularities.
341.	Problems caused by carbon build-up.
362.	Use of a wire brush.

Task 311 Remove or install spark plugs

ITEM NUMBER	KNOWLEDGE MEASURED
60.	Use of feeler gage.
109.	Required times for disconnecting battery.
157.	Procedure for checking spark plug gap on an NF-2 light cart.
216.	When grounding a unit is necessary.
259.	Inspection of spark plugs for irregularities.
295.	Use of a torque wrench.
363.	Use of a wire brush.

Task 303 Remove or install ignition coils

ITEM NUMBER	KNOWLEDGE MEASURED
109.	Required times for disconnecting battery.
272.	Define ignition coil.

Task 489 Remove or install batteries

ITEM NUMBER	KNOWLEDGE MEASURED
30.	Time when wearing a respirator is required.
314.	Procedure for removing the battery.

Task 502 Replace tow bar springs

ITEM NUMBER	KNOWLEDGE MEASURED
12.	Identify the draw bar or tow bar.

Task 488 Remove or install AGE tire, tube, or wheel assemblies *

ITEM NUMBER	KNOWLEDGE MEASURED
1.	Procedures for preventing corrosion.
11.	Identify the wheel spindle.
18.	Procedure which facilitates handling of the tire when changing the inner tube.
53.	What wheel halves are prepared with before assembly.
64.	Method for preparation of tire before reassembly of a wheel.
147.	Use of a valve core.
148.	Preparation of wheel halves before reassembly.
237.	Location for positioning jack stands.
266.	Method of jacking a unit.
277.	Procedure for full inflation of a tire.
323.	When corrosion prevention methods are used.

Task 477 Pack wheel bearings *

ITEM NUMBER	KNOWLEDGE MEASURED
7.	Identify the grease cap (or hub cap).
11.	Identify the wheel spindle.
13.	Identify the hub.
14.	Identify the cotter pin.
15.	Identify the wheel retaining nut.
37.	Preparation of components for installation of the inner bearing onto the hub.
45.	Procedure for securing the outer bearing of the wheel assembly.
54.	Procedure for packing wheel bearings.
221.	Procedure for cleaning bearings.
234.	Removal of the inner bearing of a split-half rim tire.
237.	Location of positioning jack stands.
244.	Drying and inspection procedures for bearings.
266.	Method of jacking a unit.
300.	Requirements for wearing safety gear.
327.	Location of the grease cap.
338.	Procedure for removal of inner bearing.

Task 473 Adjust brake systems

ITEM NUMBER	KNOWLEDGE MEASURED
6.	Identify the king pin.
19.	Procedure for making adjustments to brake application.
25.	Identify brake-shoe lining.
172.	Purpose of the brake lever knob.
184.	Conclusions drawn when brakes can no longer be adjusted.
237.	Location for positioning jack stands.
266.	Method of jacking a unit.

Task 479 Perform brake system operational checks

ITEM NUMBER	KNOWLEDGE MEASURED
245.	Procedure for checking parking brake.

Task 485 Remove or install AGE brake assemblies

ITEM NUMBER	KNOWLEDGE MEASURED
6.	Identify the king pin.
23.	Identify the brake lever.
24.	Identify the dust cover/adjustment cover.
25.	Identify brake-shoe lining.
26.	Identify the backing plate.
121.	Inspection of a brake assembly cam shaft.
138.	Procedure for removal of glazed spots from brake shoe lining.
172.	Purpose of the brake lever knob.

Task 486 Remove or install AGE brake assembly components

ITEM NUMBER	KNOWLEDGE MEASURED
6.	Identify the king pin.
23.	Identify the brake lever.
24.	Identify the dust cover/adjustment cover.
25.	Identify brake-shoe and lining.
26.	Identify the backing plate.
121.	Inspection of a brake assembly cam shaft.
138.	Procedure for removing glazed spots from brake shoe lining.
172.	Purpose of the brake lever knob.

ITEM NUMBER	KNOWLEDGE MEASURED
20.	Identify location of starter.
22.	Periodic inspection procedures for a radiator.
64.	Method for preparation of tire before reassembly of a wheel.
111.	Caution taken with the radiator fan.
136.	Method for checking the emergency shut down lever.
170.	Define solenoid.
197.	Procedure for grounding a unit.
254.	Location of the overspeed governor.
287.	Periodic inspection for an oil filter of a generator.
300.	Requirements for wearing protective gear.
320.	Number of threads that should protrude past a nut.

Task 270 Perform engine, motor, or generator operational checks

ITEM NUMBER	KNOWLEDGE MEASURED
111.	Caution taken with the radiator fan.
116.	Inspection of a control panel.
225.	Service inspection of the manifold block on a hydraulic test stand.
230.	Operational inspection of lights.
340.	Procedure for checking protective tray lamps.
343.	Inspection of meters and gages.

Task 264 Isolate engine, motor, or generator mechanical malfunctions *

ITEM NUMBER	KNOWLEDGE MEASURED
60.	Use of feeler gauge.
132.	Methods for checking ignition timing.
137.	Troubleshooting techniques when engine will not start when cranked.
144.	Identify meter which measures current flow.
157.	Procedure for checking spark plug gap on an NF-2 light cart.
159.	Identify location of the carburetor.
161.	Point gap for an NF-2 light cart.
168.	Condensor should be changed out whenever points are changed.
179.	Causes of a Packette engine backfiring.
252.	Interpretation of an oil dip stick reading.
259.	Inspection of spark plugs for irregularities.
260.	Adjustment of the carburetor fuel-air mixture.
274.	Identify the idle adjustment screw.
275.	Identify the main adjustment screw.
353.	Method for adjustment of the ignition timing.

Task 322 Research TO's for maintenance instructions on engines, motors, or generators *

ITEM NUMBER	KNOWLEDGE MEASURED
38.	Identify information included under a technical order series number.
229.	Information included in technical order sections.
355.	Define illustrated parts breakdown (IPB).

Task 272 Perform TO modifications on engines, motors, or generators

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ITEM NUMBER	KNOWLEDGE MEASURED
65.	Define technical order modification.
355.	Define illustrated parts breakdown (IPB).

Task 255 Change generators or alternators *

ITEM NUMBER	KNOWLEDGE MEASURED
40.	Identify the end bell.
41.	Identify the end bell band.
42.	Identify the armature.
43.	Identify the stator.
68.	Correct position of brushes when installing on a generator.
77.	Procedure for key after removal from generator.
100.	Method for rotating the armature when cleaning.
109.	Required times for disconnecting battery.
127.	Identify the frame assembly.
153.	Procedure for removal of the armature shaft.
195.	Procedure for reinstallation of the armature.
294.	Precautions taken with brushes when being removed from the alternator.
295.	Use of a torque wrench.
320.	Number of threads that should protrude past a nut.
332.	Location of the control box.
336.	Reattachment of the ground wire during reinstallation of the generator.

Task 299 Remove or install engines, motors, or generators

ITEM NUMBER	KNOWLEDGE MEASURED
98.	Precautions when working on a B-5 maintenance stand.
320.	Number of threads that should protrude past a nut.
333.	Frequency of operational inspection of shop support equipment.

Task 273 Prepare engines, motors, or generators for storage

ITEM NUMBER	KNOWLEDGE MEASURED
1.	Procedures for preventing corrosion.
90.	Define pickling oil.
92.	Removal of oil, air pressure, and fuel when preparing a unit for storage.
214.	Identify the AFTO form number for the Equipment Status form.
261.	Clean an atomizer assembly.
323.	When corrosion prevention methods are used.

Task 298 Remove or install engine, motor, or generator baffles or shrouds

ITEM NUMBER	KNOWLEDGE MEASURED
20.	Identify location of starter.
76.	Identify purpose of a baffle.
152.	Location of the cylinder head in relation to other components.

Task 265 Isolate generator cooling fan malfunctions

ITEM NUMBER	KNOWLEDGE MEASURED
113.	Location of fan guards.

Task 269 Perform cylinder compression tests

ITEM NUMBER	KNOWLEDGE MEASURED
85.	Appropriate use for compression tester kit.
93.	Define PSI.
123.	Define firing order.
216.	When grounding a unit is necessary.
231.	Define compression.
233.	What PSI symbolizes.
248.	Define mechanical injector.
259.	Inspection of spark plugs for irregularities.
291.	Define what a magneto supplies.

Task 281 Remove or install engine cylinder head assemblies

ITEM NUMBER	KNOWLEDGE MEASURED
70.	Identify governor types.
94.	Procedure for installation of seals and gaskets on a cylinder block.
104.	Identify the water manifold.
128.	Correct torque sequence when reinstalling a head assembly.
146.	Components removed before removal of the cylinder head assembly.
152.	Location of the cylinder head in relation to other components.
159.	Identify the location of the carburetor.
175.	Identify the push rod.
176.	Identify the rocker arm.
180.	When removal of enclosure assembly is necessary.
201.	Use of new packing.
248.	Define mechanical injector.
295.	Use of a torque wrench.
301.	Inspection of counterbores on cylinders.
332.	Location of the control box.
337.	Safety reasons for disconnecting fuel lines.
342.	Precautions taken when removing the air intake manifold.
372.	Identify the piston crown.

Task 260 Clean motor or generator armatures *

ITEM NUMBER	KNOWLEDGE MEASURED
81.	Procedure for removal of generator cover for cleaning purposes.
100.	Method for rotating the armature when cleaning.
109.	Required times for disconnecting battery.
300.	Requirements for wearing protective gear.
349.	Use of commutator stone.
370.	Necessity of cleaning slip rings after cleaning the commutator.

Task 283 Remove or install engine exhaust manifolds, seals, gaskets, or common hardware

ITEM NUMBER	KNOWLEDGE MEASURED
159.	Identify location of the carburetor.
164.	Number of studs which hold the exhaust manifold in place.
180.	When removal of enclosure assembly is necessary.
292.	Procedure for installation of manifold gaskets and seals.
295.	Use of a torque wrench.
316.	Clamp types.
352.	Procedure for preparing surface of carburetor and manifold for installation of gaskets.
374.	Location of the exhaust manifold.

Task 289 Remove or install engine intake manifolds, seals, gaskets, or common hardware

ITEM NUMBER	KNOWLEDGE MEASURED
109.	Required times for disconnecting battery.
295.	Use of a torque wrench.
320.	Number of threads that should protrude past a nut.
342.	Precautions taken when removing the air intake manifold.
352.	Procedure for preparing surface of carburetor and manifold for installation of gaskets.

Task 314 Remove or install starters

ITEM NUMBER	KNOWLEDGE MEASURED
20.	Identify location of starter.
218.	Isolation of battery when troubleshooting pneumatic systems and starters.
284.	Method for insuring serviceability of the solenoid coil.
295.	Use of a torque wrench.

Task 228 Remove or install gauges

ITEM NUMBER	KNOWLEDGE MEASURED
302.	Identification of gages needing immediate replacement.

Task 199 Clean indicator light receptacles or connectors

ITEM NUMBER	KNOWLEDGE MEASURED
46.	Identify the correct cleaner for indicator light receptacles or connectors.
276.	Clean load contactors.

Task 239 Straighten indicator light receptacles or connectors

ITEM NUMBER	KNOWLEDGE MEASURED
109.	Required times for disconnecting battery.
115.	Method for straightening pins on a light receptacle or contactor.

Task 284 Remove or install engine fan belts *

ITEM NUMBER	KNOWLEDGE MEASURED
72.	Method for checking belt tension.
109.	Required times for disconnecting battery.
166.	Procedure for taking up slack in the fan belt.
207.	Procedure for removal of a fan belt.
263.	Deflection allowed in drive belts.

Task 285 Remove or install engine flywheels

ITEM NUMBER	KNOWLEDGE MEASURED
130.	Appropriate application of anti-seize compound.
143.	Correct position of capscrews when installing a flywheel.
210.	Use of the flywheel lifting tool.
227.	Relation of flywheel housing to the flywheel assembly.
247.	Identify the crankshaft.
271.	What components must be separated for removal of the flywheel.
286.	Location of the flywheel.
289.	Alignment of flywheel bolt holes and crankshaft bolt holes.
295.	Use of a torque wrench.
333.	Frequency of operational inspection of shop support equipment.

Task 293 Remove or install engine oil pressure-operated switches

ITEM NUMBER	KNOWLEDGE MEASURED
119.	Define tag leads.
211.	Location of the oil pressure override button.
241.	Define schematic diagram.
313.	Location of oil system components.

Task 296 Remove or install engine thermostats

ITEM NUMBER	KNOWLEDGE MEASURED
102.	Identify the thermostat.
103.	Identify the by-pass tube.
104.	Identify the water manifold.
105.	Identify the water outlet elbow.
351.	Procedure for draining the radiator.

Task 317 Remove or install turbine engine combustor cans

ITEM NUMBER	KNOWLEDGE MEASURED
34.	Use of various lockwiring (safety wiring) methods.
39.	Inspection procedure for the V-band clamp.
91.	Identify times when wearing gloves is required.
97.	Procedure for capping lines.
209.	Periodic inspection of the combustor cap of the -60 generator.
249.	Ident'fy the flame tube assembly as part of the combustion can.
257.	Inspection of the ignitor plug.
295.	Use of a torque wrench.
303.	Location of atomizer.
350.	Location of the combustor cap and surrounding components.

Task 316 Remove or install turbine engine atomizers

ITEM NUMBER	KNOWLEDGE MEASURED
34.	Use for various lockwiring (safety wiring) methods.
114.	Describe hose assembly at the atomizer.
119.	Define tag leads.
201.	Use of new packing.
209.	Periodic inspection of the combustor cap portion of the -60 generator.
249.	Identify the flame tube assembly as part of the combustion can.
257.	Inspection of the ignitor plug.
295.	Use of a torque wrench.
303.	Location of atomizer.
311.	Unit for which a FOD check is required.

Task 261 Clean turbine engine atomizers

ITEM NUMBER	KNOWLEDGE MEASURED
249.	Identify the flame tube assembly as part of the combustion can.
261.	Clean an atomizer assembly.
350.	Location of the combustor cap and surrounding components.

Task 315 Remove or install turbine engine atomizer components

ITEM NUMBER	KNOWLEDGE MEASURED
201.	Use of new packing.
217.	Identify components inside of an ignition breaker assembly.
249.	Identify the flame tube assembly as part of the combustion can.
295.	Use of a torque wrench.
303.	Location of atomizer.
350.	Location of the combustor cap and surrounding components.

Task 160 Perform gas turbine compressor visual or service inspections

ITEM NUMBER	KNOWLEDGE MEASURED
62.	Procedure for checking equipment forms.
67.	Inspection of a bleed air hose.
158.	Method for straightening doors.
165.	Safety of operation vehicle inspection.
185.	Service inspection on an A/M32A-86 generator.
192.	Configuration of an ignition switch when performing a voltage check.
208.	Service inspection of a gas turbine compressor.
214.	Identify the AFTO form number for the Equipment Status form.
225.	Service inspection of the manifold block on a hydraulic test stand.
230.	Operational inspection of lights.
245.	Procedure for checking the parking brake.
252.	Interpretation of an oil dip stick reading.
282.	Use of multimeter scale for performing a continuity check.
300.	Requirements for wearing protective gear.
340.	Procedure for checking protective tray lamps.
343.	Inspection of meters and gages.

Task 179 Perform gas turbine compressor periodic inspections *

ITEM NUMBER	KNOWLEDGE MEASURED
34.	Use for various lockwiring (safety wiring) methods.
60.	Use of feeler gauge.
97.	Procedure for capping lines.
114.	Describe hose assembly at the atomizer.
118.	Grounding of the magneto lead to the engine block during a Periodic Inspection on a Packette engine.
191.	Cleaner for the fuel pump.
197.	Procedure for grounding a unit.
205.	Appropriate use of compressed air.
209.	Periodic inspection of the combustor cap of the -60 generator.
210.	Use of new packing.
215.	Inspection of the "T-bolt" of a V-band clamp.
232.	Periodic inspection of cracks on a flame tube assembly.
249.	Identify the flame tube assembly as part of the combustion can.
257.	Inspection of the ignitor plug.
261.	Clean an atomizer assembly.
300.	Requirements for wearing protective gear.
303.	Location of atomizer.
307.	Procedure for the O-ring seal before replacing the atomizer screen.
310.	Procedure for removal of the atomizer screen.
350.	Location of the combustor cap and surrounding components.
368.	Meaning of impulse coupling snapping.

Task 250 Adjust turbine engine bleed air system components

ITEM NUMBER	KNOWLEDGE MEASURED
29.	Use for a receiver air gauge.
34.	Use for various lockwiring (safety wiring) methods.
117.	Identify the A.S.S. valve.
300.	Requirements for wearing protective gear.
365.	Precautions taken opening a pneumatic line.

Task 439 Adjust bleed air load control valves

ITEM NUMBER	KNOWLEDGE MEASURED
171.	Method of measuring the rate of opening time for a load control valve on a gas turbine compressor unit.
220.	Define how the plane of rotation is identified.

Task 475 Isolate brake system malfunctions

ITEM NUMBER	KNOWLEDGE MEASURED
13.	Identify the hub.
23.	Identify the brake lever.
24.	Identify the dust cover/adjustment cover.
25.	Identify brake-shoe and lining.
26.	Identify the backing plate.
121.	Inspection of a brake assembly cam shaft.
126.	Identify the brake assembly.
138.	Procedure for removing glazed spots from brake shoe lining.
213.	Inspection of cables on a generator set.
237.	Location for positioning jack stands.
245.	Procedure for checking parking brake.
266.	Method of jacking a unit.

Task 503 Research TO's, charts, or diagrams for AGE enclosures, chassis, or drives *

ITEM NUMBER	KNOWLEDGE MEASURED
38.	Identify information included under a technical order series number.
229.	Information included in technical order sections.
355.	Define illustrated parts breakdown (IPB).

Task 481 Perform TO modifications on enclosures, chassis, or drives

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ITEM NUMBER	KNOWLEDGE MEASURED
65.	Define technical order modification.

Task 493 Remove or install enclosure assemblies

ITEM NUMBER	KNOWLEDGE MEASURED
76.	Identify purpose of a baffle.
180.	When removal of enclosure assembly is necessary.
333.	Frequency of operational inspection of shop support equipment.

Task 498 Remove or install steering system components

ITEM NUMBER	KNOWLEDGE MEASURED
124.	Identify the front end assembly.
125.	Identify the U-bolts.
237.	Location for positioning jack stands.
245.	Procedure for checking parking brake.
266.	Method of jacking a unit.
373.	Procedure for installation of wheel half nuts, bolts, and washers.

Task 499 Remove or install steering system component parts

ITEM NUMBER	KNOWLEDGE MEASURED
5.	Identify the tongue assembly.
6.	Identify the king pin.
8.	Identify the axle.
9.	Identify the tie rod.
10.	Identify the ball joint.
11.	Identify the wheel spindle.
12.	Identify the draw bar or tow bar.
13.	Identify the hub.
16.	Identify the appropriate location for a bushing.

Task 238 Splice electrical system wiring *

ITEM NUMBER	KNOWLEDGE MEASURED
2.	Procedure for crimping a connector with a crimping tool.
28.	Identify the splicing method which uses a barrel splice.
44.	Procedure for heat shrink insulation before applying solder.
51.	Describe procedure for crimping a connector.
156.	Use of solder gun vs. solder iron.
187.	Procedure for securing heat shrink insulation in place.
242.	Define barrel splice vs. soldering splice.
268.	Method for stripping wire.
318.	Twist and tin lead wires before inserting them into splice.
358.	Procedure for applying flux to a conductor when soldering.

Task 202 Fabricate wiring or wire harnesses

ITEM NUMBER	KNOWLEDGE MEASURED
328.	Interpretation of the wire designation numbers.

Task 212 Measure voltages of AGE electrical systems other than integrated or solid state circuitry

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ITEM NUMBER	KNOWLEDGE MEASURED
144.	Identify meter which measures current flow.
194.	Use of multimeter.
241.	Define schematic diagram.

Task 209 Measure resistance of AGE electrical systems other than integrated or solid state circuitry *

ITEM NUMBER	KNOWLEDGE MEASURED
109.	Required times for disconnecting battery.
112.	Conducting continuity checks.
139.	Identify Technical Order for the MC-2A Davey.
144.	Identify meter which measures current flow.
163.	Purpose of performing a continuity check.
192.	Configuration of an ignition switch when performing a voltage check.
194.	Use of multimeter.
241.	Define schematic diagram.
262.	Checking for power at the ignition coil.
272.	Define ignition coil.
317.	Method for continuity checks in an ignition system.
334.	Isolate and perform a continuity check on the ignition system resistor.
366.	Define Ohms.

Task 203 Isolate malfunctions within electrical circuitry other than integrated or solid state circuitry

ITEM NUMBER	KNOWLEDGE MEASURED
78.	Define current.
109.	Required times for disconnecting battery.
144.	Identify meter which measures current flow.
194.	Use of multimeter.
203.	Define amps.
216.	When grounding a unit is necessary.
241.	Define schematic.
282.	Use of multimeter scale for performing a continuity check.
339.	Knowledge required if allowed to work with high voltage.
366.	Define Ohms.

Task 227 Remove or install electrical system components other than integrated or solid state circuitry

ITEM NUMBER	KNOWLEDGE MEASURED
109.	Required times for disconnecting battery.
119.	Define tag leads.
170.	Define solenoid.
207.	Procedure for removal of the fan belt.
213.	Inspection of cables on a generator set.
241.	Define schematic diagram.
314.	Procedure for removing the battery.
321.	Method for insuring serviceability of the solenoid coil.
322.	Define relay.
328.	Interpretation of the wire designation numbers.
340.	Procedure for checking protective tray lamps.

Task 236 Research TO's, charts, or diagrams for electrical maintenance instructions

ITEM NUMBER	KNOWLEDGE MEASURED
38.	Identify information included under a technical order series number.
229.	Information included in technical order sections.
355.	Define illustrated parts breakdown (IPB).

Task 215 Perform AGE electrical system operational checks other than integrated or solid state circuitry *

ITEM NUMBER	KNOWLEDGE MEASURED
31.	Correct position of contactor switch when putting a load on line for an operational inspection.
32.	Precaution that a load bank must be grounded prior to load banking any generator set.
52.	Position of phase selector switch for performance of an electrical system operational check.
133.	Method for opening switches after load banking any generator set.
144.	Identify meter which measures current flow.
151.	Interpretation of the AC contactor indication light.
198.	Rotation of the phase selector knob.
296.	Purpose of monitoring the EGT gage.
308.	Reason for monitoring unit and load bank gages while load banking a unit.

Task 226 Remove or install cannon plugs

ITEM NUMBER	KNOWLEDGE MEASURED
109.	Required times for disconnecting battery.
156.	Use of solder gun vs. solder iron.
194.	Use of multimeter.
246.	Define cannon plug.
258.	Use of padded channel locks.
318.	Twist and tin lead wires before inserting them into splice.
358.	Procedure for applying flux to a conductor when soldering.

Task 237 Solder electrical system wiring

ITEM NUMBER	KNOWLEDGE MEASURED
28.	Identify the splicing method which uses a barrel splice.
173.	Application of flux when soldering spliced wires.
242.	Define barrel splice vs. soldering splice.
318.	Twist and tin lead wires before inserting them into splice.
358.	Procedures for applying flux to a connector when soldering.

Task 225 Remove or install cannon plug parts

ITEM NUMBER	KNOWLEDGE MEASURED
109.	Required times for disconnecting battery.
156.	Use of solder gun vs. solder iron.
194.	Use of multimeter.
202.	Identify the grommet.
246.	Define cannon plug.
258.	Use of padded channel locks.
318.	Twist and tin lead wires before inserting them into a splice.
358.	Procedure for applying flux to connector when soldering.

Task 235 Remove or install voltage regulators

ITEM NUMBER	KNOWLEDGE MEASURED
109.	Required times for disconnecting battery.
241.	Define schematic diagram.
375.	Procedure for removal of the voltage regulator from the -60 generator set.

Task 494 Remove or install hinges, stays, or fasteners

ITEM NUMBER	KNOWLEDGE MEASURED
79.	Use of drill.
106.	Method for removal of rivets.
150.	Method for attaching fasteners.
300.	Requirements for wearing protective gear.
311.	Unit for which a FOD check is required.

Task 504 Straighten panels, doors, or covers

ITEM NUMBER	KNOWLEDGE MEASURED
158.	Method for straightening bent doors.

Task 478 Paint, stencil, or mark AGE

ITEM NUMBER	KNOWLEDGE MEASURED
30.	Time when wearing a respirator is required.
167.	Define field number.
256.	Procedure for application of field numbers to units.
293.	Paint colors used for different categories of information.

Task 484 Reflectorize AGE

ITEM NUMBER	KNOWLEDGE MEASURED
89.	Appropriate application of reflective tape to AGE vehicles.

Task 482 Prepare AGE for painting except magnesium housings

ITEM NUMBER	KNOWLEDGE MEASURED
251.	Procedure for sanding a unit in preparation for painting.
300.	Requirements for wearing protective gear.

Task 555 Prepare AGE for mobility or training exercises *

ITEM NUMBER	KNOWLEDGE MEASURED
21.	Requirements for preparing a unit for shipping.
33.	Procedure for preparing lights on a light cart for shipment.
61.	Appropriate fuel level of a unit when air shipping.
109.	Required times for disconnecting battery.
178.	Procedure for preparation of tires for air shipment.
188.	Procedure for storing light cables of an NF-2 when preparing for mobility and training.
235.	Documentation shipped with AGE units for mobility.

Task 275 Remove or install carburetors *

ITEM NUMBER	KNOWLEDGE MEASURED
109.	Required times for disconnecting battery.
159.	Identify the location of the carburetor.
239.	Connection of the governor linkage after installation of a carburetor.
270.	Periodic inspection of the oil bath air cleaner.
315.	Procedure for the choke cable when removing a carburetor.
337.	Safety reasons for disconnecting fuel lines.
347.	Location of the air cleaner.
352.	Procedure for preparing surface of carburetor and manifold for installation of gaskets.

Task 286 Remove or install engine fuel pumps *

ITEM NUMBER	KNOWLEDGE MEASURED
57.	Identify location of the fuel pump.
66.	Procedure for removal of fuel pump.
109.	Required times for disconnecting battery.
131.	Insure proper alignment of cam arm and pump before installation of a fuel pump.
191.	Cleaner for the fuel pump.
267.	Location of components around the fuel pump.
325.	Close fuel shut-off valve before removing fuel pump.
346.	Procedure for installation of a new fuel pump.
352.	Procedure for preparing surface of carburetor and manifold for installation of gaskets.
364.	Procedure for disconnecting fuel lines when removing the fuel pump.

Task 300 Remove or install fuel lines or fittings other than diesel *

ITEM NUMBER	KNOWLEDGE MEASURED
73.	Method for placing a tube in the holding bar of a flaring tool.
74.	Use of flaring tool to make flare on tube.
299.	Use of a deburring tool.
346.	Procedure for installation of a new fuel pump.

Task 263 Fabricate engine fuel lines

ITEM NUMBER	KNOWLEDGE MEASURED
36.	Identify correct angle used when cutting tubing.
73.	Method for placing a tube in the holding bar of a flaring tool.
74.	Use of a flaring tool to make flare on tube.
93.	Define PSI.
134.	Use of tubing cutters.
155.	Periodic inspection on fuel lines.
193.	Use of tubing benders.
233.	What PSI symbolizes.

Task 248 Adjust reciprocating engine fuel system components

ITEM NUMBER	KNOWLEDGE MEASURED
159.	Identify the location of the carburetor.
297.	Procedure for setting the idle mixture adjustment.

Task 251 Adjust turbine engine fuel system components *

ITEM NUMBER	KNOWLEDGE MEASURED
34.	Use for various lockwiring (safety wiring) methods.
109.	Required times for disconnecting battery.
199.	Procedure for adjusting cracking pressure.
255.	Procedure taken before adjusting cracking pressure.
303.	Location of atomizer.
304.	Procedure for bleeding air from a hydraulic line.
337.	Safety reasons for disconnecting fuel lines.

Task 487 Remove or install AGE fuel tanks or components

ITEM NUMBER	KNOWLEDGE MEASURED
264.	Define fog a fuel tank.

Task 483 Purge fuel tanks

ITEM NUMBER	KNOWLEDGE MEASURED
264.	Define fog a fuel tank.

Task 142 Make entries on AFTO forms 349 (maintenance data collection record)

ITEM NUMBER	KNOWLEDGE MEASURED
27.	Identify the "How MAL Code."
47.	Describe the information which goes in the "Quantity" block on AFTO Form 350.
75.	Identify a work center code.
80.	Define ID number.
82.	Identify a type maintenance code.
181.	Identify the action taken code.
306.	Define the job control number.
319.	Identify the work unit code.
344.	Describe some discrepancies for AFTO Form 244.
363.	Procedure for writing time and date on AFTO Form 349.

Task 143 Make entries on AFTO forms 350 (reparable item processing tag)

ITEM NUMBER	KNOWLEDGE MEASURED
27.	Identify the "How MAL Code."
47.	Describe the information which goes in the "Quantity" block on AFTO Form 350.
80.	Define ID number.
82.	Identify a type maintenance code.
96.	Identify location of the Federal Stock Class number on AFTO Form 350.
160.	Identify the Standard Reporting Description (SRD).
238.	Define nomenclature.
250.	Identify the national stock number (NSN).
253.	Identify the when discovered code.
290.	Identify an organization code.
306.	Define the job control number.
319.	Identify a work unit code.
344.	Describe some discrepancies for AFTO Form 244.

Task 108 Maintain AFTO form 244 and AFTO form 245 (system/equipment status record and continuation sheet)

ITEM NUMBER	KNOWLEDGE MEASURED
75.	Identify a work center code.
80.	Define ID number.
154.	Procedure for noting the carry forward discrepancy on AFTO Form 244.
167.	Define field number.
222.	Completion of the non-scheduled inspection section of AFTO Form 244.
250.	Identify the national stock number (NSN).
306.	Define the job control number.
324.	Identify the registration number.
342.	Identify the work unit code.
357.	Identify the condition code.

Task 120 Make entries on AF Form 2005 (issue/turn-in request) *

ITEM NUMBER	KNOWLEDGE MEASURED
4.	Identify colors of tags used for NRTS items.
49.	Identify the activity code.
80.	Define ID number.
101.	Define serviceability.
149.	Define condemned.
290.	Identify an organization code.
335.	Identify the shop code.
357.	Identify the condition code.
363.	Procedure for writing time and date on AFTO Form 349.
367.	Identify the sequence code.

Task 162 Perform hydraulic test stand visual or service inspections *

ITEM NUMBER	KNOWLEDGE MEASURED
55.	Identify location of a hydraulic test stand.
59.	Define high pressure relief valve.
62.	Procedure for checking equipment forms.
87.	Procedure for performing an operational check on the flow control valve.
108.	Correct hydraulic reservoir fluid level on a hydraulic test stand.
110.	Method for checking fuel level.
206.	Service inspection of external hoses on a hydraulic test stand.
212.	Frequency of an operational inspection of a hydraulic test stand.
214.	Identify the AFTO number on the Equipment Status form.
225.	Service inspection of the manifold block on a hydraulic test stand.
245.	Procedure for checking the parking brake.

Task 181 Perform hydraulic test stand periodic inspections *

ITEM NUMBER	KNOWLEDGE MEASURED
34.	Use for various lockwiring (safety wiring) methods.
109.	Required times for disconnecting battery.
201.	Use of new packing.
228.	Procedure for releiving system pressure on a hydraulic test stand.
280.	Order of parts in the filter assembly of a hydraulic test stand.
285.	Periodic inspection on a hydraulic test stand high pressure filter assembly.
360.	Procedure for low pressure filter assembly of a hydraulic test stand during a periodic inspection.

Task 407 Perform AGE hydraulic system operational checks

ITEM NUMBER	KNOWLEDGE MEASURED
30.	Time when wearing a respirator is required.
48.	Interpretation of the warning horn on a hydraulic test stand.
136.	Method for checking the emergency shut down lever.
312.	Identify the pressure compensator valve.
361.	Position of the reservoir selector valve during a fill and bleed operation.
371.	Define the volume control valve.

Task 421 Remove or install hydraulic lines or fittings *

ITEM NUMBER	KNOWLEDGE MEASURED
3.	Procedure for removing a hose from a hydraulic pump and ram.
71.	Method for servicing a reservoir in a hydraulic system.
189.	Position of drip pan when in use.
304.	Procedure for bleeding air from a hydraulic line.
330.	Hydraulic fluid type for a unit.

AD-A258 150 A COMPARISON OF DOMAIN SAMPLING PROCEDURES FOR TEST CONSTRUCTION(U) ARMSTRONG LAB BROOKS AFB TX M S LIPSCOMB OCT 92 AL-TP-1992-0032 XC-AL/BROOKS 2/2

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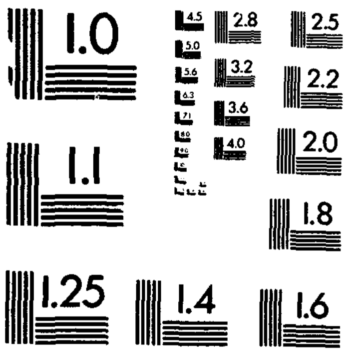

Task 405 Drain, flush, and refill AGE hydraulic reservoirs

ITEM NUMBER	KNOWLEDGE MEASURED
30.	Time when wearing a respirator is required.
55.	Identify location of a hydraulic test stand.
108.	Correct hydraulic reservoir fluid level on a hydraulic test stand.
109.	Required times for disconnecting battery.
135.	Identify the cleaner for outside of the hydraulic reservoir.
240.	What is used to flush a contaminated hydraulic reservoir.
312.	Identify the pressure compensator valve.
330.	Hydraulic fluid type for a unit.
361.	Position of the reservoir selector valve when performing a fill and bleed operation.
371.	Define the volume control valve.

Task 406 Isolate hydraulic system malfunctions

ITEM NUMBER	KNOWLEDGE MEASURED
50.	Identify gages found on a hydraulic test stand control panel.
241.	Define schematic diagram.
312.	Identify the pressure compensator valve.
330.	Hydraulic fluid type for a unit.
361.	Position of the reservoir selector valve when performing a fill and bleed operation.
371.	Define the volume control valve.

Task 437 Research TO's, charts, or diagrams for AGE hydraulic systems maintenance instructions

ITEM NUMBER	KNOWLEDGE MEASURED
38.	Identify information included under a technical order series number.
229.	Information included in technical order sections.
355.	Define illustrated parts breakdown (IPB).

Task 436 Replace seals or "O" rings in hydraulic system components

ITEM NUMBER	KNOWLEDGE MEASURED
201.	Use of new packing.
298.	Coat hydraulic system O-rings with hydraulic fluid.
307.	Procedure for the O-ring seal before replacing the atomizer screen.

Task 398 Adjust hydraulic fill and bleed systems

ITEM NUMBER	KNOWLEDGE MEASURED
59.	Define high pressure relief valve.
361.	Position of the reservoir selector valve when performing a fill and bleed operation.
376.	Define the fill system relief valve.

Task 568 Perform general shop housekeeping, such as cleaning drip pans and sweeping floors

ITEM NUMBER	KNOWLEDGE MEASURED
142.	Procedure for cleaning the drip pan.
311.	Unit for which a FOD check is required.

Task 567 Paint shop facilities, such as desks and walls

ITEM NUMBER	KNOWLEDGE MEASURED
288.	Use of a drop cloth.

Task 544 Clean vehicles

ITEM NUMBER	KNOWLEDGE MEASURED
1.	Procedures for preventing corrosion.
30.	Time when wearing a respirator is required.
88.	Procedure for cleaning AGE vehicles.
311.	Unit for which a FOD check is required.
323.	When corrosion prevention methods are used.

Task 447 Perform AGE pneumatic system operational checks

ITEM NUMBER	KNOWLEDGE MEASURED
31.	Correct position of contactor switch when putting a load on line for an operational inspection.
35.	Identify valves which must be closed to build up pressure on an MC-1A air compressor.
69.	Define blowdown.
93.	Define PSI.
169.	Define the purpose of an air regulator.
204.	When observation of RPMs is important.
211.	Location of the oil pressure override button.
233.	What PSI symbolizes.
279.	Configuration of switches when connecting the power cable for load testing a generator set.
365.	Precautions when opening a pneumatic line.

Task 472 Research TO's, charts, or diagrams for AGE pneumatic systems maintenance instructions

ITEM NUMBER	KNOWLEDGE MEASURED
38.	Identify information included under a technical order series number.
229.	Information included in technical order sections.
355.	Define illustrated parts breakdown (IPB).

Task 446 Isolate pneumatic system malfunctions *

ITEM NUMBER	KNOWLEDGE MEASURED
31.	Correct position of contactor switch when putting a load on line for an operational inspection.
69.	Define blowdown.
218.	Isolation of battery when troubleshooting pneumatic systems.
228.	Procedure for relieving system pressure on a hydraulic test stand.
279.	Configuration of switches when connecting the power cable for load testing a generator set.
282.	Use of multimeter scale for performing a continuity check.
321.	Method for insuring serviceability of the solenoid coil.
366.	Define Ohms.

Task 467 Remove or install pneumatic system lines or fittings

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ITEM NUMBER	KNOWLEDGE MEASURED
97.	Procedure for capping lines.
109.	Required times for disconnecting battery.
365.	Precautions when opening a pneumatic line.

Task 468 Remove or install pneumatic system pressure gauges

ITEM NUMBER	KNOWLEDGE MEASURED
97.	Procedure for capping lines.
109.	Required times for disconnecting battery.
302.	Identification of gages needing immediate replacement.
365.	Precautions when opening a pneumatic line.

Task 457 Remove or install pneumatic filtering system components

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ITEM NUMBER	KNOWLEDGE MEASURED
109.	Required times for disconnecting battery.
236.	Use of filter wrench.
265.	Frequency of draining the moisture separator.
331.	Frequency of changing dehydrators.
365.	Precautions when opening a pneumatic line.

Task 152 Perform aircraft support air compressor visual or service inspections

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ITEM NUMBER	KNOWLEDGE MEASURED
62.	Procedure for checking equipment forms.
91.	Identify times when wearing gloves is required.
162.	Precautions taken when fueling AGE units.
200.	Precaution taken when removing the radiator cap.
213.	Inspection of cables on a generator set.
214.	Identify the AFTO form number on the Equipment Status form.
225.	Service inspection of the manifold block on a hydraulic test stand.
231.	Define compression.
245.	Procedure for checking parking brake.
265.	Frequency of draining the moisture separator.
331.	Frequency of changing dehydrators.

Task 171 Perform aircraft support air compressor periodic inspections

ITEM NUMBER	KNOWLEDGE MEASURED
20.	Identify location of starter.
31.	Correct position of contactor switch when putting a load on line for an operational inspection.
35.	Identify valves which must be closed to build up pressure on an MC-1A air compressor.
54.	Procedure for packing wheel bearings.
57.	Identify location of the fuel pump.
64.	Method for preparation of tire before reassembly of a wheel.
69.	Define blowdown.
72.	Method for checking belt tension.
99.	Inspect a battery.
155.	Periodic inspection on fuel lines.
180.	When removal of enclosure assembly is necessary.
182.	Frequency of the 10-micron air filter element inspection.
196.	Location of the sediment bowl.
219.	Periodic inspection on a frame assembly.
221.	Procedure for cleaning bearings.
231.	Define compression.
245.	Procedure for checking parking brake.
263.	Deflection allowed in drive belts.
264.	Define fog a fuel tank.
270.	Periodic inspection of the oil bath air cleaner.
273.	Adjustment of the float and needle assembly.
279.	Configuration of switches when connecting the power cable for load testing a generator set.
291.	Define what a magneto supplies.
309.	Inspection of pintle hooks.
328.	Interpretation of wire designation numbers.
331.	Frequency of changing dehydrators.

Task 155 Perform aircraft support load bank visual or service inspections *

ITEM NUMBER	KNOWLEDGE MEASURED
32.	Precaution that a load bank must be grounded prior to load banking any generator set.
269.	Location of fuse values needed for a unit.
343.	Inspection of meters and gages.

Task 268 Load test generator sets

ITEM NUMBER	KNOWLEDGE MEASURED
32.	Precaution that a load bank must be grounded prior to load banking any generator set.
95.	Bank used for a resistive load.
122.	Identify the correct phase sequence when loading a unit.
140.	Define Hz.
279.	Configuration of switches when connecting the power cable for load testing a generator set.
284.	Purpose of the PF meter.

Task 548 Fuel AGE

ITEM NUMBER	KNOWLEDGE MEASURED
107.	Identification of correct fuel for each unit.
162.	Precautions taken when fueling AGE units.
243.	Identify fuel types.

Task 549 Inspect vehicles for safety of operation *

ITEM NUMBER	KNOWLEDGE MEASURED
56.	Procedure for checking the coolant level in a sealed cooling system.
62.	Procedure for checking equipment forms.
99.	Inspect a battery.
165.	Safety of operation vehicle inspection.
167.	Define field number.
214.	Identify the AFTO number on the Equipment Status form.
230.	Operational inspection of lights.
245.	Procedure for checking parking brake.
252.	Interpretation of an oil dip stick reading.
309.	Inspection of pintle hooks.
326.	Location of the exhaust system/spark arrestor.
329.	Components checked for leaks during a safety of operation inspection.

Task 170 Perform shop support equipment visual or service inspections

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ITEM NUMBER	KNOWLEDGE MEASURED
333.	Frequency of operational inspection of shop support equipment.
359.	Frequency of an operational inspection of eye washers.

Task 157 Perform bomb lift visual or service inspections

190.	Service inspection on a bomb lift.

Task 246 Adjust gas turbine engine governors

ITEM NUMBER	KNOWLEDGE MEASURED
86.	Identify location of the fuel control cluster.
204.	When observation of RPMs is important.

Task 245 Adjust gas reciprocating engine governors

ITEM NUMBER	KNOWLEDGE MEASURED
63.	Procedure for adjusting spring tension on a gas reciprocating engine governor.
171.	Method of measuring rate of opening time for a load control valve on a gas turbine compressor unit.
204.	When observation of RPMs is important.
345.	Location of the turbine engine governor.

Task 291 Remove or install engine mechanical governors

ITEM NUMBER	KNOWLEDGE MEASURED
345.	Location of the turbine engine governor.

Task 552 Operate two-way vehicle radios

ITEM NUMBER	KNOWLEDGE MEASURED
224.	Proper radio response.

Task 554 Pick up or deliver AGE or AGE parts

ITEM NUMBER	KNOWLEDGE MEASURED
83.	Define pick-up delivery area.
91.	Identify times when wearing gloves is required.
224.	Proper radio response.

* Indicates tasks which were tested in the Walk-Through Performance Test

APPENDIX B

EXAMPLES OF COMPREHENSIVE JOB KNOWLEDGE TEST ITEMS

1 - A / B

AEROSPACE GROUND EQUIPMENT

GENERAL MECHANIC

AFSC 454X1

JOB KNOWLEDGE TEST

AFPT 80-423-205

AEROSPACE GROUND EQUIPMENT SPECIALTY (AFS 454X1)
JOB KNOWLEDGE TEST

Directions:

Turn your answer sheet and print your name and the date in the blocks provided. Fill in the corresponding ovals. In the "Numeric Grid," enter your SSAN in positions 1 through 9. In the block marked "Sex" blacken the appropriate oval. In the block marked "Code" fill in the oval designated by the test administrator.

Each item in this booklet consists of a question or statement followed by four choices. There is only one choice that answers the question or completes the statement correctly. Be sure to read each question and all of the choices before answering. Decide which choice is correct and blacken the letter on your answer sheet that matches the letter and item number. Here is an example:

112 What color is the sky?

A. Red
B. Yellow
C. Blue
D. Green

SAMPLE ANSWER SHEET

112 

Since the sky is blue, the answer is C. On the sample answer sheet, the oval containing the C has been blackened.

Be sure to use a number 2 pencil and blacken only one oval for each item. Note that the answer sheet has an "E" response whereas the test has no "E" options. Please be careful not to fill in the letter "E" response at any time. If you have to change an answer, erase your first mark completely, and then mark your new choice. Erase any stray marks being careful not to tear the answer sheet.

The questions in this booklet are to be answered on spaces 1 - 376 on the answer sheet you have been given.

Do not spend too much time on any one item. If you have trouble with an item, skip it, and come back to it after you finish the other items. Although you may be unfamiliar with a task, make the best choice you can for each item. Try to answer every item.

This test has been designed to determine the amount of knowledge you have of the Aerospace Ground Equipment Specialty (AFSC 454X1). The information collected will be used for research purposes only and will have no effect on your career. Test results will be available for your review after all tests have been administered. If you would like to see your test results at this later date, please indicate so by signing the TEST RETURN SIGN-UP SHEET.

PRIVACY ACT STATEMENT

AUTHORITY: 44USC3103, 10USC133, 10USC3012, EO9397

The information collected by the answer sheet will be used solely for research and development purposes. Use of the social security account number is necessary to make positive identification of the individual and records.

Information provided by respondents will be treated as confidential and will be used for official research purposes only. Individual identity will not be revealed. The research information obtained will be used only to improve the utilization of personnel resources within the Armed Forces.

Cooperation and disclosure of this information is voluntary. Failure to provide information would hinder the ability of the Armed Forces to best utilize its personnel resources. Your cooperation in this effort is appreciated.

1. Which of the following is <u>NOT</u> a corrosion preventive maintenance method?

   A. Inspection.

   B. Cleaning.

   C. Painting.

   D. Replacement.

2. What is the proper crimping method for a connector when joining two wires with a solderless connector?

   A. Crimp wire at any spot on either side of the connector.

   B. Crimp wire half way between center and end on both sides of the connector.

   C. Crimp wire only once at center of connector.

   D. Crimp wire at the outer edge of both sides of the connector.

3. What is the correct procedure for removing a hydraulic hose from the ram and pump?

   A. Apply one open-end wrench to the hose nipple and a second to the hose fitting.

   B. Use an open-end wrench to remove hose and nipple assembly as a unit.

   C. Use vise grips to remove the hose and nipple assembly as a unit.

   D. Use two adjustable wrenches to remove the hose nipple and the hose fitting.

4. What are the colors of the two tags used for NRTS items?

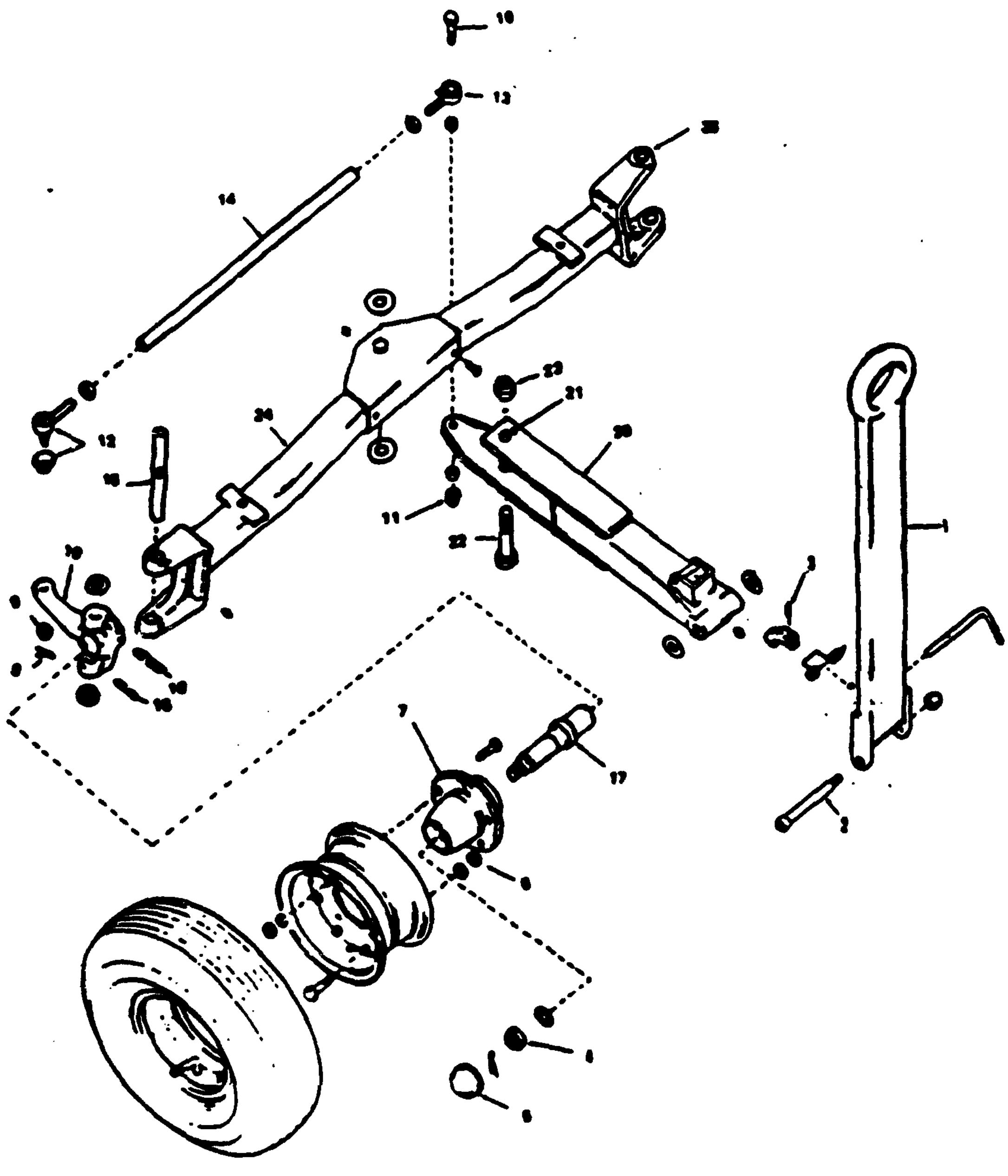
   A. Green and red.

   B. Green and yellow.

   C. Red and yellow.

   D. Red and white.

Use the numbers on the attached illustration of a front axle assembly to answer questions 5 - 16.



5. Identify the TONGUE ASSEMBLY.

A. 1

B. 20

C. 24

D. 25

6. Identify the KING PIN.

A. 8

B. 15

C. 16

D. 22

7. Identify the GREASE CAP (or HUB CAP).

A. 5

B. 7

C. 10

D. 12

8. Identify the AXLE.

A. 1

B. 14

C. 20

D. 24

9. Identify the TIE ROD.

A. 10

B. 12

C. 14

D. 17

10. Identify a BALL JOINT.

A. 10

B. 11

C. 12

D. 15

11. Identify the WHEEL SPINDLE.

A. 7

B. 17

C. 24

D. 25

12. Identify the DRAW BAR (or TOW BAR).

A. 1

B. 14

C. 20

D. 24

13. Identify the HUB.

A. 5

B. 7

C. 13

D. 19

14. Identify a COTTER PIN.

A. 3

B. 8

C. 16

D. 18

15. Identify the WHEEL RETAINING NUT (or CASTELLATED NUT).

A. 4

B. 6

C. 11

D. 23

16. Identify the location in which a BUSHING would be installed.

A. 12

B. 17

C. 19

D. 25

17. What should be used to clean contactors?

A. A coarse file.

B. A burnishing tool and electrical contact cleaner.

C. A shop rag and electrical contact cleaner.

D. A shop rag and PD-680 type II solvent.

18. What should be done to facilitate handling of the tire when changing the inner-tube?

A. Install the deflated inner-tube into tire assembly.

B. Slightly inflate inner-tube inside tire to prevent pinching.

C. Inflate inner-tube outside tire to 10-15 psi.

D. Use silicone grease on tube and inside tire surface to ease assembly.

19. If the handbrake lever knob reaches the limit of its adjustment, what is the most common method of making further adjustments?

    A. Shorten the linkage.

    B. Lengthen the linkage.

    C. Replace the linkage.

    D. Replace the adjustment knob mechanism.

20. To what component is the starter secured?

    A. Crankcase.

    B. Engine block.

    C. Gear box.

    D. Torque convertor.

21. Which of the following does <u>NOT</u> have to be stenciled on a unit before the unit is shipped?

    A. Weight of unit.

    B. Center of balance.

    C. Date and time unit is prepared for shipment.

    D. Height, length, and width of unit.

22. Which of the following is <u>NOT</u> done to the radiator during a periodic inspection?

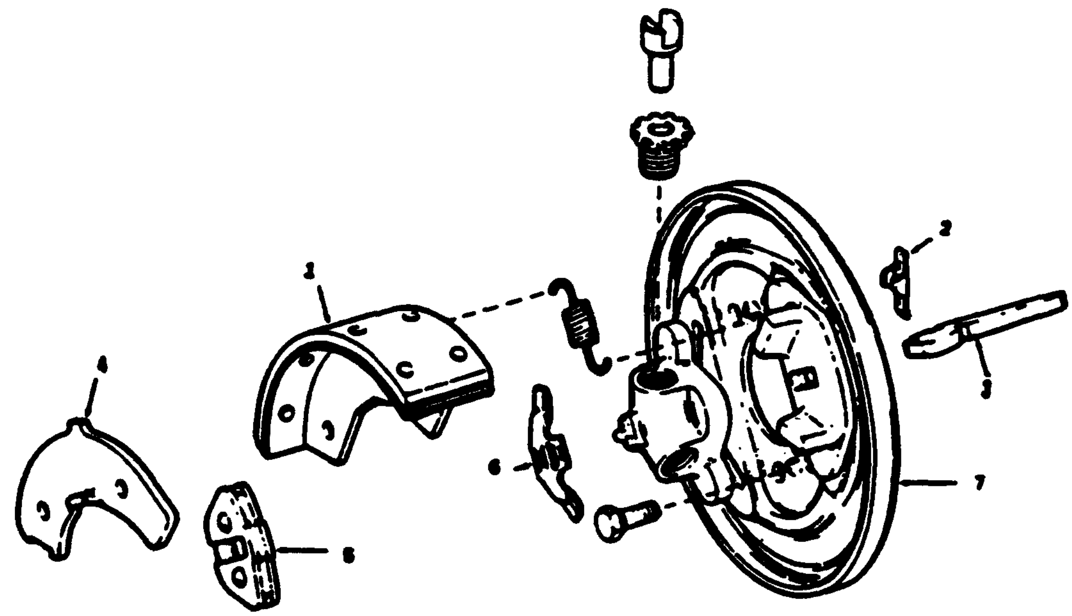
    A. Pressure test.

    B. Check for obstructions.

    C. Clean outer core with solvent (PD-680 type II).

    D. Check for proper coolant level.

Use the attached illustration of a Brake Drum Assembly to answer questions 23 - 26.



23. Identify the BRAKE LEVER.

A. 2

B. 3

C. 5

D. 6

24. Identify the DUST COVER/ADJUSTMENT COVER.

A. 2

B. 4

C. 5

D. 6

25. Identify the BRAKE SHOE and LINING.

A. 1

B. 4

C. 5

D. 7

26. Identify the BACKING PLATE.

A. 2

B. 4

C. 6

D. 7

27. Which of the following is a "How MAL Code?"

A. Q

B. 20

C. 020

D. GAD

28. What splicing method requires the use of a barrel splice?

A. Crimp.

B. Soldered heat shrink.

C. Twist and solder.

D. Wicking.

29. What does a receiver air gage measure?

A. Compression.

B. Air Flow.

C. Air Quality.

D. Air Quantity

30. When are you required to wear a respirator?

A. When being exposed to flammable liquids.

B. When using pressurized water.

C. When transporting liquid acid containers.

D. When being exposed to paint particles.

31. When performing an operational check on AGE electrical systems, where do you position the contactor switch to put the load on line?

A. Open position.

B. Closed position.

C. Reset position.

D. Neutral position.

32. Prior to load banking any generator set, what safety precaution must be taken?

    A. Turn "on" the generator's AC contactor switch and connect to load bank.

    B. Assure load bank is properly grounded.

    C. Be sure all shock load switches are in the "on" position.

    D. Close the cable doors.

33. How do you prepare the lights on a light cart for shipment?

    A. Remove and box.

    B. Secure in position.

    C. Stow in the internal brackets.

    D. Disconnect from sockets and tape.

34. Which of the following statements is true concerning safety wiring methods?

    A. Always use the double-twist method.

    B. The double-twist method is recommended for use on screws in a closely spaced pattern.

    C. The single-twist method is used in places that are difficult to reach.

    D. The single-twist method is the most commonly used one.

35. What valves must be closed to build up pressure on an MC-1A air compressor?

    A. Dehydrator bleed valve and receiver drain valve.

    B. Dehydrator bleed valve and regulator isolation valve.

    C. Regulator isolation valve and air service valve.

    D. Priority valve and air service valve.

36. How would you describe the correct angle at which copper tubing should be cut?

A. At a slight angle.

B. At a 45 degree angle.

C. At any angle.

D. Square.

37. What must you do to the bearing cone and rollers, the spindle, and races before installing the inner bearing onto the hub?

A. Clean thoroughly.

B. Clean, inspect, and sufficiently grease.

C. Always replace them with new parts and then grease.

D. Nothing required, just reinstall.

38. What type of equipment is covered in the 35C2 technical order series?

A. Air compressors.

B. Generators.

C. Heaters.

D. Test stands.

39. Which of the following would NOT be a concern when inspecting the V-band clamp on a bleed air hose?

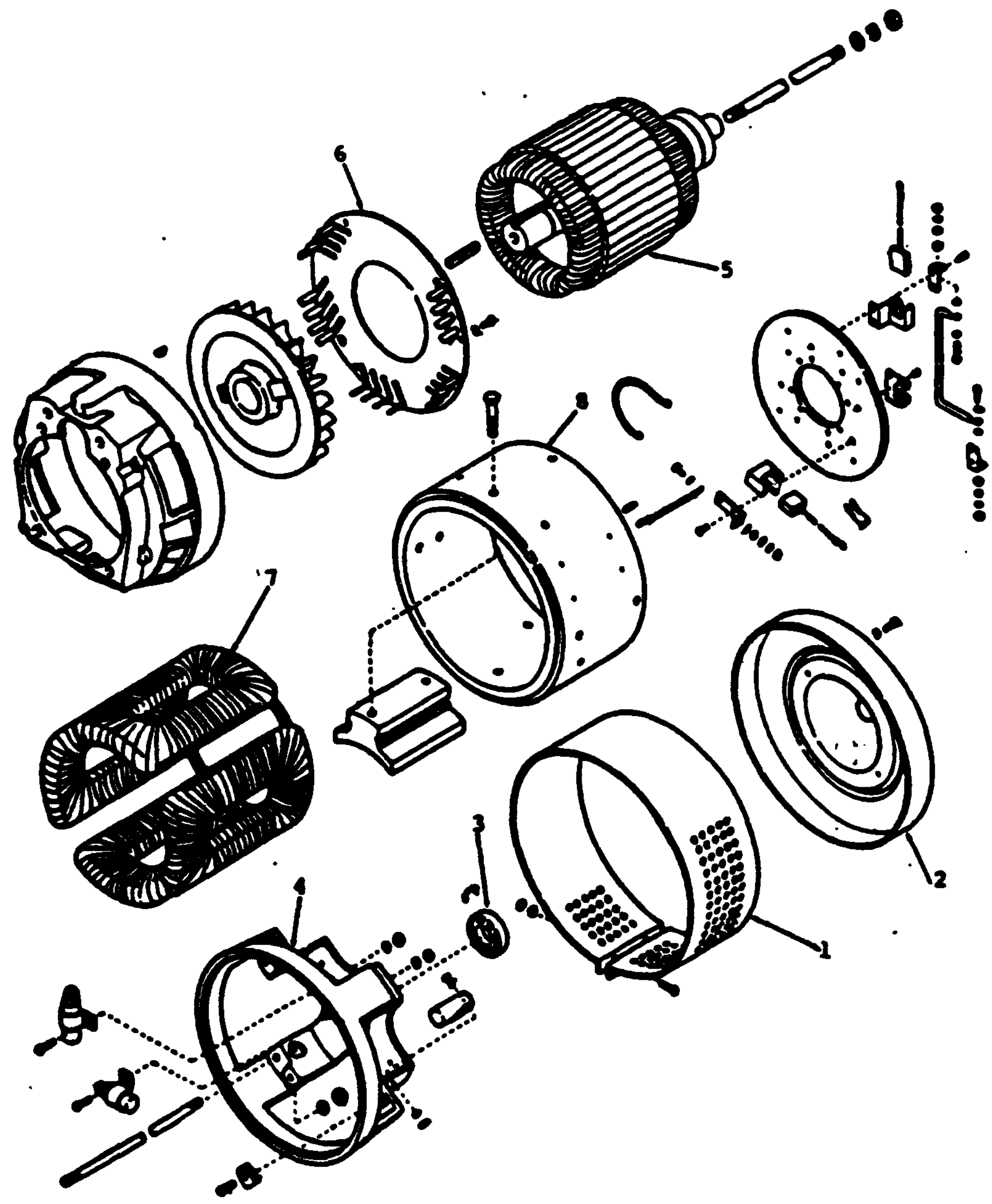
A. Tool marks and cracks.

B. Spreading at the open ends.

C. Radial distortion.

D. Discoloration.

Use the illustration of the Generator to answer questions 40 - 43.



40. Identify the END BELL.

A. 1

B. 2

C. 4

D. 8

41. Identify the END BELL BAND.

A. 1

B. 2

C. 4

D. 8

42. Identify the ARMATURE.

A. 3

B. 5

C. 6

D. 7

43. Identify the STATOR.

A. 5.

B. 6.

C. 7.

D. 8.

44. What is the first thing you do with the heat shrink insulation when soldering two wires together?

A. Slide it over one end of the exposed conductor and apply heat to one side to tack the insulation in place before beginning.

B. Slide it over one end of the exposed conductor and slide it up the lead and out of the way.

C. The heat shrink insulation is not needed until the splice is complete; therefore, it should be set out of the way.

D. Split evenly down one side to allow for proper installation and proper shrinkage.

45. Which of the following methods should be used to secure the outer bearing after replacing the wheel assembly?

A. Install nut and torque to 25 foot pounds.

B. While rotating wheel, tighten the nut until noticeable resistance is felt; back nut off one full turn.

C. Tighten nut until heavy drag is felt; rotate wheel; tighten until next castellation.

D. While rotating the wheel, tighten the nut until heavy drag is felt; back off to first castellation.

46. What is the correct type of cleaner for use on indicator light receptacles or connectors?

A. Contact cleaner.

B. Acid cleaner.

C. Solvent.

D. Emery cloth.

47. What sort of information goes into the "QTY" block on AFTO Form 350 if transporting an NF-2 with a cracked door hinge?

A. Crew size.

B. Number of units.

C. Number of parts.

D. Amount of time required for repairs.

48. What does the warning horn on a hydraulic test stand indicate?

A. Low fuel.

B. Low reservoir level.

C. Low boost pressure.

D. High fluid temperature.

49. Which of the following is an activity code that could be found on an AF Form 2005 (Supply Issue and Turn In Form)?

A. X

B. R5

C. 622

D. 2124

50. Which of the following would NOT be found on a MJ-2A hydraulic test stand control panel?

A. Air pressure gage.

B. Supply inlet gage.

C. Exhaust temperature gage.

D. Stand reservoir pressure gage.

51. What is meant by crimping a connector?

A. To bend at either side in order to prevent connector slippage.

B. To press together on either side to form a solid connection.

C. To lengthen a short wire, without replacing the entire wire assembly.

D. To shorten a wire, without replacing the entire wire assembly.

APPENDIX C

RATING FORMS

SUPERVISORY RATING FORM

Supervisor:____________________

Please use the scale below to rate ______________________________ on their KNOWLEDGE in eight general areas of the AGE career field. The scale is repeated at the top of each page. The eight areas are listed with definitions of each. Write your rating of the individual's knowledge in the space to the right of each area.

KNOWLEDGE RATING SCALE

5 Able to recognize and identify components in complex and common systems. Knows all procedures and system relationships. Knows many trouble shooting methods. Aware of all safety precautions.

4 Able to recognize and identify components of some complex systems and most common systems. Knows most procedures and system relationships. Knows some troubleshooting methods. Aware of most safety precautions.

3 Able to recognize and identify components of most common systems. Knows many procedures and system relationships. Knows how to find the troubleshooting charts. Aware of many safety precautions.

2 Able to recognize and identify some components of common systems. Knows some procedures and system relationships. Knows how to find troubleshooting charts with some difficulty. Aware of basic safety precautions.

1 Able to recognize or identify a few components of common systems. Knows very few procedures or system relationships. Able to find troubleshooting charts only with great difficulty. Aware of a few basic safety precautions.

I. GENERAL AGE MAINTENANCE RATING = _____

Knowledge of common hand tools, special tools, test equipment, and shop support equipment for the use of isolating and correcting malfunctions by removing, repairing, and replacing components. This includes knowledge concerning tasks such as lockwire installation, corrosion treatment, and minor structural repair.

II. AGE ADMINISTRATIVE FUNCTIONS RATING = _____

Knowledge of technical orders systems for the purpose of locating maintenance information and completing required entries in maintenance forms. Example: knows how to research and identify parts using IPBs and then make proper entries in AFTO Forms 244, 350, or AF Form 2005.

KNOWLEDGE RATING SCALE

5 Able to recognize and identify components in complex and common systems. Knows all procedures and system relationships. Knows many troubleshooting methods. Aware of all safety precautions.

4 Able to recognize and identify components of some complex systems and most common systems. Knows most procedures and system relationships. Knows some troubleshooting methods. Aware of most safety precautions.

3 Able to recognize and identify components of most common systems. Knows many procedures and system relationships. Knows how to find the troubleshooting charts. Aware of many safety precautions.

2 Able to recognize and identify some components of common systems. Knows some procedures and system relationships. Knows how to find troubleshooting charts with some difficulty. Aware of basic safety precautions.

1 Able to recognize or identify a few components of common systems. Knows very few procedures or system relationships. Able to find troubleshooting charts only with great difficulty. Aware of a few basic safety precautions.

III. AGE GAS TURBINE MAINTENANCE RATING = _____

Knowledge required for isolating and correcting malfunctions within the electrical, pneumatic, fuel and lubrication systems of gas turbine compressors. This includes knowledge of procedures required for removing, replacing, cleaning and adjusting.

IV. AGE PERIODIC INSPECTIONS RATING = _____

Knowledge of scheduled preventative maintenance actions as outlined in the appropriate technical data. This includes knowledge of the system on which the periodic inspection is performed.

V. AGE PNEUDRAULIC SYSTEM MAINTENANCE RATING = _____

Knowledge required to isolate and correct malfunctions in AGE pneumatic and hydraulic systems. This includes knowledge of procedures required for removing, replacing, adjusting, and performing operational checks.

KNOWLEDGE RATING SCALE

5 Able to recognize and identify components in complex and common systems. Knows all procedures and system relationships. Knows many troubleshooting methods. Aware of all safety precautions.

4 Able to recognize and identify components of some complex systems and most common systems. Knows most procedures and system relationships. Knows some troubleshooting methods. Aware of most safety precautions.

3 Able to recognize and identify components of most common systems. Knows many procedures and system relationships. Knows how to find the troubleshooting charts. Aware of many safety precautions.

2 Able to recognize and identify some components of common systems. Knows some procedures and system relationships. Knows how to find troubleshooting charts with some difficulty. Aware of basic safety precautions.

1 Able to recognize or identify a few components of common systems. Knows very few procedures or system relationships. Able to find troubleshooting charts only with great difficulty. Aware of a few basic safety precautions.

VI. AGE RECIPROCATING ENGINE MAINTENANCE RATING = _____

Knowledge required to isolate and correct malfunctions in AGE gasoline and diesel engines. Examples: knowledge of complex maintenance actions such as removal and replacement of a cylinder assembly; knowledge required for routine tasks such as removing and replacing engine thermostats or oil pressure switches.

VII. AGE ELECTRONIC SYSTEM MAINTENANCE RATING = _____

Knowledge required to isolate and correct malfunctions in electrical and electronic circuits and components. It includes the knowledge required to splice, solder, treat corrosion, adjust, clean, remove, replace and measure voltage and resistance.

VIII. AGE PICK-UP, DELIVERY AND SERVICE FUNCTIONS RATING = _____

Knowledge required to prepare units for use and expediting delivery to the flightline. Examples: knowledge required to perform service inspections, service fuel and oil, exercise proper towing and positioning procedures, operate two-way radios and clean vehicles.

AEROSPACE GROUND EQUIPMENT

AFSC 454X1

SELF-RATING FORMS

AFPT 80-423-205

GENERAL BACKGROUND INFORMATION

YOUR
NAME______________________________________ SSAN _____-____-_______
Last First MI

MONTHS IN SERVICE: ________

MONTHS IN CAREER FIELD: ________

SKILL LEVEL: ________

BASE: ________________

KNOWLEDGE RATING FORM

Please use the KNOWLEDGE RATING SCALE below to rate yourself on the amount of KNOWLEDGE you have in the eight general areas of the AGE career field. The eight areas are listed with definitions of each. Write your rating of your own knowledge in the space to the right of each area.

KNOWLEDGE RATING SCALE

5 - Very Great Amount of Knowledge

4 - Great Amount of Knowledge

3 - Moderate Amount of Knowledge

2 - Small Amount of Knowledge

1 - None or Almost No Knowledge

I. GENERAL AGE MAINTENANCE RATING = _____

Knowledge of common hand tools, special tools, test equipment, and shop support equipment for the use of isolating and correcting malfunctions by removing, repairing, and replacing components. This includes knowledge concerning tasks such as lockwire installation, corrosion treatment, and minor structural repair.

II. AGE ADMINISTRATIVE FUNCTIONS RATING = _____

Knowledge of technical orders systems for the purpose of locating maintenance information and completing required entries in maintenance forms. Example: knows how to research and identify parts using IPBs and then make proper entries in AFTO Forms 244, 350, or AF Form 2005.

III. AGE GAS TURBINE MAINTENANCE RATING = _____

Knowledge required for isolating and correcting malfunctions within the electrical, pneumatic, fuel, and lubrication systems of gas turbine compressors. This includes knowledge of procedures required for removing, replacing, cleaning, and adjusting.

IV. AGE PERIODIC INSPECTIONS RATING = _____

Knowledge of scheduled preventative maintenance actions as outlined in the appropriate technical data. This includes knowledge of the system on which the periodic inspection is performed.

KNOWLEDGE RATING SCALE

5 - Very Great Amount of Knowledge

4 - Great Amount of Knowledge

3 - Moderate Amount of Knowledge

2 - Small Amount of Knowledge

1 - None or Almost No Knowledge

V. AGE PNEUDRAULIC SYSTEM MAINTENANCE RATING = _____

Knowledge required to isolate and correct malfunctions in AGE pneumatic and hydraulic systems. This includes knowledge of procedures required for removing, replacing, adjusting, and performing operational checks.

VI. AGE RECIPROCATING ENGINE MAINTENANCE RATING = _____

Knowledge required to isolate and correct malfunctions in AGE gasoline and diesel engines. Examples: knowledge of complex maintenance actions such as removal and replacement of a cylinder assembly; knowledge required for routine tasks such as removing and replacing engine thermostats or oil pressure switches.

VII. AGE ELECTRONIC SYSTEM MAINTENANCE RATING = _____

Knowledge required to isolate and correct malfunctions in electrical and electronic circuits and components. It includes the knowledge required to splice, solder, treat corrosion, adjust, clean, remove, replace, and measure voltage and resistance.

VIII. AGE PICK-UP, DELIVERY, AND SERVICE FUNCTIONS RATING = _____

Knowledge required to prepare units for use and expediting delivery to the flightline. Examples: knowledge required to perform service inspections, service fuel and oil, exercise proper towing and positioning procedures, operate two-way radios, and clean vehicles.

EXPERIENCE AND TRAINING RATING FORM

Please use the RATING SCALE below to rate yourself on the amount of EXPERIENCE and TRAINING you have received in the eight general areas of the AGE career field. The eight areas are listed with definitions of each. Write your rating in the space to the right of each area.

RATING SCALE

5 - Very Great Amount of Experience and Training

4 - Great Amount of Experience and Training

3 - Moderate Amount of Experience and Training

2 - Small Amount of Experience and Training

1 - None or Almost No Experience and Training

I. GENERAL AGE MAINTENANCE RATING = _____

Use of common hand tools, special tools, test equipment, and shop support equipment for isolating and correcting malfunctions by removing, repairing, and replacing components. This includes tasks such as lockwire installation, corrosion treatment, and minor structural repair.

II. AGE ADMINISTRATIVE FUNCTIONS RATING = _____

Use of technical orders systems for the purpose of locating maintenance information and completing required entries in maintenance forms. Example: research and identify parts using IPBs and then make proper entries in AFTO Forms 244, 350, or AF Form 2005.

III. AGE GAS TURBINE MAINTENANCE RATING = _____

Isolates and corrects malfunctions within the electrical, pneumatic, fuel, and lubrication systems of gas turbine compressors. This includes removing, replacing, cleaning, and adjusting.

IV. AGE PERIODIC INSPECTIONS RATING = _____

Conducts scheduled preventative maintenance actions as outlined in the appropriate technical data.

RATING SCALE

5 - Very Great Amount of Experience and Training

4 - Great Amount of Experience and Training

3 - Moderate Amount of Experience and Training

2 - Small Amount of Experience and Training

1 - None or Almost No Experience and Training

V. AGE PNEUDRAULIC SYSTEM MAINTENANCE RATING = _____

Isolates and corrects malfunctions in AGE pneumatic and hydraulic systems. This includes removing, replacing, adjusting, and performing operational checks.

VI. AGE RECIPROCATING ENGINE MAINTENANCE RATING = _____

Isolates and corrects malfunctions in AGE gasoline and diesel engines. Examples: performs complex maintenance actions such as removal and replacement of a cylinder assembly; performs routine tasks such as removing and replacing engine thermostats or oil pressure switches.

VII. AGE ELECTRONIC SYSTEM MAINTENANCE RATING = _____

Isolates and corrects malfunctions in electrical and electronic circuits and components. Includes splicing, soldering, treating corrosion, adjusting, cleaning, removing, replacing, and measuring voltage and resistance.

VIII. AGE PICK-UP, DELIVERY, AND SERVICE FUNCTIONS RATING = _____

Prepares units for use and expedites delivery to the flightline. Examples: performs service inspections, services fuel and oil, exercises proper towing and positioning procedures, operates two-way radios, and cleans vehicles.

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VARIABLE LABELS MEANSELF 'JOB KNOWLEDGE RATINGS-SELF'
               /MEANSUP 'JOB KNOWLEDGE RATINGS-SUPERVISOR'
               /MEANEXP 'EXPERIENCE/TRAINING RATINGS'
               /FGRADE 'TECHNICAL TRAINING GRADE'
               /PH1TS 'JOB PERFORMANCE SCORE'
               /TRSEA 'PERFORMANCE RATING-SELF'
               /TRSUA 'PERFORMANCE RATING-SUPERVISOR'
               /TRPEA 'PERFORMANCE RATING-PEER'
               /GSSS 'GENERAL SCIENCE STANDARD SCORE'
               /ARSS 'ARITHMETIC REASONING STANDARD SCORE'
               /WKSS 'WORD KNOWLEGDE STANDARD SCORE'
               /PCSS 'PARAGRAPH COMPREHENSION STANDARD SCORE'
               /NOSS 'NUMERICAL OPERATIONS STANDARD SCORE'
               /CSSS 'CODING SPEED STANDARD SCORE'
               /ASSS 'AUTO/SHOP STANDARD SCORE'
               /MKSS 'MATH KNOWLEDGE STANDARD SCORE'
               /MCSS 'MECHANICAL COMPREHENSION STANDARD SCORE'
               /EISS 'ELECTRONIC INFORMATION STANDARD SCORE'
               /AFQT 'AIR FORCE QUALIFYING TEST SCORE'
               /PTOTAL 'TOTAL TEST SCORE - TOTAL SAMPLE'
               /PTR100A 'TR100 - TOTAL SAMPLE'
               /PTR50A 'TR50 - TOTAL SAMPLE'
               /PTR25A 'TR25 - TOTAL SAMPLE'
               /PTR12A 'TR12 - TOTAL SAMPLE'
               /PTR6A 'TR6 - TOTAL SAMPLE'
               /PTJ100A 'TJ100 - TOTAL SAMPLE'
               /PTJ50A 'TJ50 - TOTAL SAMPLE'
               /PTJ25A 'TJ25 - TOTAL SAMPLE'
               /PTJ12A 'TJ12 - TOTAL SAMPLE'
               /PTJ6A 'TJ6 - TOTAL SAMPLE'
               /PMASTER 'MASTER TOTAL TEST SCORE '
               /MTR100A 'MASTER TR100 '
               /MTR50A 'MASTER TR50 '
               /MTR25A 'MASTER TR25 '
               /MTR12A 'MASTER TR12 '
               /MTR6A 'MASTER TR6 '
               /MTJ100A 'MASTER TJ100 '
               /MTJ50A 'MASTER TJ50 '
               /MTJ25A 'MASTER TJ25 '
               /MTJ12A 'MASTER TJ12 '
               /MTJ6A 'MASTER TJ6 '
               /PNOVICE 'NOVICE TOTAL TEST SCORE '
               /NTR100A 'NOVICE TR100 '
               /NTR50A 'NOVICE TR50 '
               /NTR25A 'NOVICE TR25 '
               /NTR12A 'NOVICE TR12 '
               /NTR6A 'NOVICE TR6 '
               /NTJ100A 'NOVICE TJ100 '
               /NTJ50A 'NOVICE TJ50 '
               /NTJ25A 'NOVICE TJ25 '
               /NTJ12A 'NOVICE TJ12 '
               /NTJ6A 'NOVICE TJ6 '
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- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

	MEANSELF	MEANSUP	MEANEXP	FGRADE	PHITS	TRSEA	TRSUA	TRPEA	GSSS	ARSS	WKSS
MEANSELF	1.0000 (293) P= .	.4378 (293) P= .000	.8567 (292) P= .000	.0636 (79) P= .289	.2907 (81) P= .004	.5260 (80) P= .000	.1164 (80) P= .152	.1199 (80) P= .145	.0994 (69) P= .208	-.0290 (69) P= .407	.0173 (69) P= .444
MEANSUP	.4378 (293) P= .000	1.0000 (294) P= .	.4122 (292) P= .000	.1063 (79) P= .175	.2340 (81) P= .018	.2232 (80) P= .023	.3387 (80) P= .001	.2783 (80) P= .006	.0470 (69) P= .351	.1311 (69) P= .141	-.2263 (69) P= .031
MEANEXP	.8567 (292) P= .000	.4122 (292) P= .000	1.0000 (292) P= .	-.0026 (79) P= .491	.3024 (81) P= .003	.4153 (80) P= .000	-.0199 (80) P= .430	.0427 (80) P= .353	.0588 (69) P= .316	-.1642 (69) P= .089	-.1188 (69) P= .165
FGRADE	.0636 (79) P= .289	.1063 (79) P= .175	-.0026 (79) P= .491	1.0000 (79) P= .	.3677 (79) P= .000	.1075 (78) P= .174	.1690 (78) P= .070	.1569 (78) P= .085	.0775 (67) P= .267	.0387 (67) P= .378	.1042 (67) P= .201
PHITS	.2907 (81) P= .004	.2340 (81) P= .018	.3024 (81) P= .003	.3677 (79) P= .000	1.0000 (81) P= .	.2725 (80) P= .007	.1661 (80) P= .070	.2991 (80) P= .004	.3339 (69) P= .003	.1681 (69) P= .084	.2334 (69) P= .027
TRSEA	.5260 (80) P= .000	.2232 (80) P= .023	.4153 (80) P= .000	.1075 (78) P= .174	.2725 (80) P= .007	1.0000 (80) P= .	.2875 (80) P= .005	.3901 (80) P= .000	.0342 (68) P= .391	-.0281 (68) P= .410	-.0137 (68) P= .456
TRSUA	.1164 (80) P= .152	.3387 (80) P= .001	-.0199 (80) P= .430	.1690 (78) P= .070	.1661 (80) P= .070	.2875 (80) P= .005	1.0000 (80) P= .	.4456 (80) P= .000	.1863 (68) P= .064	-.1168 (68) P= .171	.0262 (68) P= .416
TRPEA	.1199 (80) P= .145	.2783 (80) P= .006	.0427 (80) P= .353	.1569 (78) P= .085	.2991 (80) P= .004	.3901 (80) P= .000	.4456 (80) P= .000	1.0000 (80) P= .	.0942 (68) P= .222	-.0137 (68) P= .456	.0398 (68) P= .374
GSSS	.0994 (69) P= .208	.0470 (69) P= .351	.0588 (69) P= .316	.0775 (67) P= .267	.3339 (69) P= .003	.0342 (68) P= .391	.1863 (68) P= .064	.0942 (68) P= .222	1.0000 (69) P= .	.0523 (69) P= .335	.5627 (69) P= .000
ARSS	-.0290 (69) P= .407	.1311 (69) P= .141	-.1642 (69) P= .089	.0387 (67) P= .378	.1681 (69) P= .084	-.0281 (68) P= .410	-.1168 (68) P= .171	-.0137 (68) P= .456	.0523 (69) P= .335	1.0000 (69) P= .	.1905 (69) P= .058
WKSS	.0173 (69) P= .444	-.2263 (69) P= .031	-.1188 (69) P= .165	.1042 (67) P= .201	.2334 (69) P= .027	-.0137 (68) P= .456	.0262 (68) P= .416	.0398 (68) P= .374	.5627 (69) P= .000	.1905 (69) P= .058	1.0000 (69) P= .

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	MEANSELF	MEANSUP	MEANEXP	FGRADE	PHITS	TRSEA	TRSUA	TRPEA	GSSS	ARSS	WKSS
PCSS	-.1100	-.0286	-.1656	.1980	.1624	-.1752	.0249	-.0697	.3107	-.0029	.4145
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .184	P= .408	P= .087	P= .054	P= .091	P= .077	P= .420	P= .286	P= .005	P= .490	P= .000
NOSS	.2817	.0483	.3101	-.0539	-.1890	.1830	-.0170	-.1545	-.1051	-.1293	-.2256
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .010	P= .347	P= .005	P= .333	P= .060	P= .068	P= .445	P= .104	P= .195	P= .145	P= .031
CSSS	.3072	.2574	.3063	.0077	.1301	.2360	.0834	-.0099	.0182	-.0590	-.0592
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .005	P= .016	P= .005	P= .475	P= .143	P= .026	P= .249	P= .468	P= .441	P= .315	P= .314
ASSS	.2445	.0022	.2404	.3104	.4321	.3244	.2282	.2536	.2622	-.1294	.2526
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .021	P= .493	P= .023	P= .005	P= .000	P= .003	P= .031	P= .018	P= .015	P= .145	P= .018
MKSS	.1994	.2933	.1136	.1778	.3160	.1252	.0920	.0136	.2649	.5499	.2379
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .050	P= .007	P= .176	P= .075	P= .004	P= .154	P= .228	P= .456	P= .014	P= .000	P= .024
NCSS	.1280	.3055	.0278	.3143	.2402	.2112	.1930	.4038	.1398	.2760	.1672
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .147	P= .005	P= .410	P= .005	P= .023	P= .042	P= .057	P= .000	P= .126	P= .011	P= .085
EISS	.1331	.0258	.0557	.2778	.3773	.1050	.2321	.1753	.4055	.0076	.3642
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .138	P= .417	P= .325	P= .011	P= .001	P= .197	P= .028	P= .076	P= .000	P= .475	P= .001
VERB	-.0447	-.1954	-.1629	.1381	.2361	-.1052	.0191	-.0245	.5646	.1451	.9227
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .358	P= .054	P= .091	P= .132	P= .025	P= .197	P= .439	P= .421	P= .000	P= .117	P= .000
MECH	.2412	.1107	.1942	.3402	.4839	.3007	.2799	.3309	.5601	.0127	.4148
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .023	P= .183	P= .055	P= .002	P= .000	P= .006	P= .010	P= .003	P= .000	P= .459	P= .000
ADMIN	.3015	.0868	.2717	.0266	.0524	.1856	.0414	-.1011	.1668	-.0478	.1958
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .006	P= .239	P= .012	P= .416	P= .334	P= .065	P= .369	P= .206	P= .085	P= .348	P= .053
GEN	-.0466	-.0069	-.2144	.1053	.2578	-.0800	-.0775	-.0240	.3519	.8369	.6546
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .352	P= .471	P= .038	P= .198	P= .016	P= .258	P= .265	P= .423	P= .002	P= .000	P= .000

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	MEANSELF	MEANSUP	MEANEXP	FGRADE	PHITS	TRSEA	TRSUA	TRPEA	GSSS	ARSS	WKSS
ELEC	.1633	.1904	.0349	.2346	.4842	.0994	.1637	.1102	.6411	.5821	.5114
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .090	P= .059	P= .388	P= .028	P= .000	P= .210	P= .091	P= .185	P= .000	P= .000	P= .000
AFQT	.0859	-.0313	-.0703	.0901	.2040	.0247	-.0506	-.0602	.3768	.6721	.6558
	(69)	(69)	(69)	(67)	(69)	(68)	(68)	(68)	(69)	(69)	(69)
	P= .241	P= .399	P= .283	P= .234	P= .046	P= .421	P= .341	P= .313	P= .001	P= .000	P= .000
PTOTAL	.4844	.4401	.3677	.1934	.4139	.2474	.0903	.2342	.1598	.1475	.1799
	(293)	(294)	(292)	(79)	(81)	(80)	(80)	(80)	(69)	(69)	(69)
	P= .000	P= .000	P= .000	P= .044	P= .000	P= .013	P= .213	P= .018	P= .095	P= .113	P= .070
PTR100A	.4519	.3988	.3492	.2243	.3921	.2612	.1598	.2450	.1426	.1308	.1946
	(293)	(294)	(292)	(79)	(81)	(80)	(80)	(80)	(69)	(69)	(69)
	P= .000	P= .000	P= .000	P= .023	P= .000	P= .010	P= .078	P= .014	P= .121	P= .142	P= .055
PTR50A	.4571	.3157	.3784	.1616	.3705	.2769	.0665	.1403	.0634	.1311	.0688
	(293)	(294)	(292)	(79)	(81)	(80)	(80)	(80)	(69)	(69)	(69)
	P= .000	P= .000	P= .000	P= .077	P= .000	P= .006	P= .279	P= .108	P= .302	P= .141	P= .287
PTR25A	.3750	.2857	.2328	.2247	.2775	.0792	-.0029	.1067	.1554	.1162	.1017
	(293)	(294)	(292)	(79)	(81)	(80)	(80)	(80)	(69)	(69)	(69)
	P= .000	P= .000	P= .000	P= .023	P= .006	P= .242	P= .490	P= .173	P= .101	P= .171	P= .203
PTR12A	.3017	.2408	.1982	.0607	.2204	.2528	.1090	.1844	-.0104	.1592	.0185
	(293)	(294)	(292)	(79)	(81)	(80)	(80)	(80)	(69)	(69)	(69)
	P= .000	P= .000	P= .000	P= .298	P= .024	P= .012	P= .168	P= .051	P= .466	P= .096	P= .440
PTR6A	.2923	.2441	.2617	.0471	.1445	.2690	.0714	.1036	.0608	-.0096	.1301
	(293)	(294)	(292)	(79)	(81)	(80)	(80)	(80)	(69)	(69)	(69)
	P= .000	P= .000	P= .000	P= .340	P= .099	P= .008	P= .264	P= .180	P= .310	P= .469	P= .143
PTJ100A	.4148	.3902	.3065	.2058	.3498	.2194	.1722	.2699	.1513	.1101	.2301
	(293)	(294)	(292)	(79)	(81)	(80)	(80)	(80)	(69)	(69)	(69)
	P= .000	P= .000	P= .000	P= .034	P= .001	P= .025	P= .063	P= .008	P= .107	P= .184	P= .029
PTJ50A	.4224	.3674	.3425	.1937	.3177	.1984	.0190	.1786	.0579	.0157	.0053
	(293)	(294)	(292)	(79)	(81)	(80)	(80)	(80)	(69)	(69)	(69)
	P= .000	P= .000	P= .000	P= .044	P= .002	P= .039	P= .434	P= .056	P= .318	P= .449	P= .483
PTJ25A	.3597	.3298	.3007	.0652	.3031	.2447	.0029	.0358	.1054	.1566	.0478
	(293)	(294)	(292)	(79)	(81)	(80)	(80)	(80)	(69)	(69)	(69)
	P= .000	P= .000	P= .000	P= .284	P= .003	P= .014	P= .490	P= .376	P= .184	P= .099	P= .348

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	MEANSELF	MEANSUP	MEANEXP	FGRADE	PHITS	TRSEA	TRSUA	TRPEA	GSSS	ARSS	WKSS
PTJ12A	.3412 (293) P= .000	.3084 (294) P= .000	.2380 (292) P= .000	.1086 (79) P= .175	.3950 (81) P= .000	.2103 (80) P= .031	.1356 (80) P= .115	.3044 (80) P= .003	.1641 (69) P= .089	-.0268 (69) P= .413	-.0153 (69) P= .450
PTJ6A	.3009 (293) P= .000	.3346 (294) P= .000	.2152 (292) P= .000	.0387 (79) P= .368	.1256 (81) P= .132	.2477 (80) P= .013	.1917 (80) P= .044	.0606 (80) P= .297	-.1610 (69) P= .093	.1389 (69) P= .127	-.0577 (69) P= .319
PNOVICE	.3150 (110) P= .000	.2628 (111) P= .003	.2247 (109) P= .009	.1168 (24) P= .293	.3243 (24) P= .061	.1881 (23) P= 195	-.1174 (23) P= .297	0004 (23) P= .499	.0443 (23) P= .420	-.0133 (23) P= .476	-.0298 (23) P= .446
NTR100A	.2816 (110) P= .001	.2044 (111) P= .016	.2123 (109) P= .013	.1817 (24) P= .198	.3533 (24) P= .045	.3046 (23) P= .079	-.0011 (23) P= .498	.0815 (23) P= .356	.0074 (23) P= .487	-.0432 (23) P= .422	-.0445 (23) P= .420
NTR50A	.3205 (110) P= .000	.0796 (111) P= .203	.2192 (109) P= .011	.0015 (24) P= .497	.2849 (24) P= .088	.1723 (23) P= .216	-.0988 (23) P= .327	-.0701 (23) P= .375	-.0491 (23) P= .412	-.0767 (23) P= .364	-.1301 (23) P= .277
NTR25A	.1915 (110) P= .023	.1132 (111) P= .118	.0516 (109) P= .297	.1297 (24) P= .273	.4312 (24) P= .018	.1191 (23) P= .294	.0987 (23) P= .327	.0444 (23) P= .420	.3373 (23) P= .058	-.2289 (23) P= .147	-.0012 (23) P= .498
NTR12A	.1810 (110) P= .029	.0739 (111) P= .220	.1284 (109) P= .092	-.1398 (24) P= .257	.0773 (24) P= .360	.4022 (23) P= .028	-.1450 (23) P= .254	.0165 (23) P= .470	-.2404 (23) P= .134	.0202 (23) P= .464	-.2933 (23) P= .087
NTR6A	.1408 (110) P= .071	.1831 (111) P= .027	.1494 (109) P= .061	.0387 (24) P= .429	.1025 (24) P= .317	.1057 (23) P= .316	-.0283 (23) P= .449	-.1840 (23) P= .200	.0729 (23) P= .370	.0289 (23) P= .448	.0794 (23) P= .359
NTJ100A	.2280 (110) P= .008	.1996 (111) P= .018	.1675 (109) P= .041	.1497 (24) P= .242	.3219 (24) P= .062	.1995 (23) P= .181	-.0421 (23) P= .424	-.0061 (23) P= .489	-.0283 (23) P= .449	.0042 (23) P= .492	-.0440 (23) P= .421
NTJ50A	.2784 (110) P= .002	.1298 (111) P= .088	.2226 (109) P= .010	.1100 (24) P= .304	.2555 (24) P= .114	.1873 (23) P= .196	-.2473 (23) P= .127	-.0485 (23) P= .413	-.1442 (23) P= .256	.0188 (23) P= .466	-.2101 (23) P= .168
NTJ25A	.1682 (110) P= .040	.1349 (111) P= .079	.1430 (109) P= .069	-.1552 (24) P= .234	.1905 (24) P= .188	.0761 (23) P= .365	-.1723 (23) P= .216	-.3034 (23) P= .080	-.1553 (23) P= .240	.0203 (23) P= .463	-.1022 (23) P= .321

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	MEANSELF	MEANSUP	MEANEXP	FGRADE	PHITS	TRSEA	TRSUA	TRPEA	GSSS	ARSS	WKSS
NIJ12A	.1281 (110) P= .089	.1942 (111) P= .021	.0270 (108) P= .390	-.0[illegible]99 (24) P= .373	.3487 (24) P= .049	-.1564 (23) P= .238	.0280 (23) P= .450	.0464 (23) P= .417	.0553 (23) P= .401	.1095 (23) P= .309	-.2812 (23) P= .097
NIJ6A	.2098 (110) P= .014	.1910 (111) P= .022	.1019 (108) P= .146	-.0596 (24) P= .391	.0951 (24) P= .329	.1855 (23) P= .198	-.1092 (23) P= .310	-.1336 (23) P= .272	-.1265 (23) P= .283	-.1124 (23) P= .305	-.1070 (23) P= .313
PMASTER	.3756 (51) P= .003	.2842 (51) P= .018	.2407 (51) P= .044	. (0) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTR100A	.3509 (51) P= .006	.2966 (51) P= .018	.2068 (51) P= .074	. (0) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTR50A	.4750 (51) P= .000	.2893 (51) P= .020	.4087 (51) P= .001	. (0) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTR25A	.2701 (51) P= .028	-.0753 (51) P= .300	.0261 (51) P= .428	. (0) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTR12A	.2146 (51) P= .065	.2133 (51) P= .066	.1361 (51) P= .170	. (0) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTR6A	.2599 (51) P= .033	.1401 (51) P= .163	.2655 (51) P= .030	. (0) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTJ100A	.3024 (51) P= .015	.2393 (51) P= .045	.1821 (51) P= .100	. (0) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTJ50A	.2404 (51) P= .045	.2569 (51) P= .034	.1299 (51) P= .182	. (0) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTJ25A	.1001 (51) P= .242	.1194 (51) P= .202	.0972 (51) P= .249	. (0) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .

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	MEANSELF	MEANSUP	MEANEXP	FGRADE	PHITS	TRSEA	TRSUA	TRPEA	GSSS	ARSS	WKSS
MTJ12A	.1826	-.0401	.0373	.	.	.	.	.	.	.	.
	(51)	(51)	(51)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
	P= .100	P= .390	P= .397	P= .	P= .	P= .	P= .	P= .	P= .	P= .	P= .
MTJ6A	.3395	.1707	.2051	.	.	.	.	.	.	.	.
	(51)	(51)	(51)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
	P= .007	P= .115	P= .074	P= .	P= .	P= .	P= .	P= .	P= .	P= .	P= .

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- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	PCSS	NOSS	CSSS	ASSS	MKSS	MCSS	EISS	VERB	MECH	ADMIN	GEN
MEANSELF	-.1100	.2817	.3072	.2445	.1994	.1280	.1331	-.0447	.2412	.3015	-.0466
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .184	P= .010	P= .005	P= .021	P= .050	P= .147	P= .138	P= .358	P= .023	P= .006	P= .352
MEANSUP	-.0286	.0483	.2574	.0022	.2933	.3055	.0258	-.1954	.1107	.0868	-.0089
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .408	P= .347	P= .016	P= .493	P= .007	P= .005	P= .417	P= .054	P= .183	P= .239	P= .471
MEANEXP	-.1656	.3101	.3063	.2404	.1136	.0278	.0557	-.1629	.1942	.2717	-.2144
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .087	P= .005	P= .005	P= .023	P= .176	P= .410	P= .325	P= .091	P= .055	P= .012	P= .038
FGRADE	.1980	-.0538	.0077	.3104	.1778	.3143	.2778	.1381	.3402	.0266	.1053
	(67)	(67)	(67)	(67)	(67)	(67)	(67)	(67)	(67)	(67)	(67)
	P= .054	P= .333	P= .475	P= .005	P= .075	P= .005	P= .011	P= .132	P= .002	P= .416	P= .198
PHITS	.1624	-.1890	.1301	.4321	.3160	.2402	.3773	.2361	.4839	.0524	.2578
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .091	P= .060	P= .143	P= .000	P= .004	P= .023	P= .001	P= .025	P= .000	P= .334	P= .015
TRSEA	-.1752	.1830	.2360	.3244	.1252	.2112	.1050	-.1052	.3007	.1856	-.0800
	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)
	P= .077	P= .068	P= .026	P= .003	P= .154	P= .042	P= .197	P= .197	P= .006	P= .065	P= .258
TRSUA	.0249	-.0170	.0834	.2282	.0920	.1930	.2321	.0191	.2799	.0414	-.0775
	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)
	P= .420	P= .445	P= .249	P= .031	P= .228	P= .057	P= .028	P= .439	P= .010	P= .369	P= .265
TRPEA	-.0697	-.1545	-.0099	.2536	.0136	.4038	.1753	-.0245	.3309	-.1011	-.0240
	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)	(68)
	P= .286	P= .104	P= .468	P= .018	P= .456	P= .000	P= .076	P= .421	P= .003	P= .206	P= .423
GSSS	.3107	-.1051	.0182	.2622	.2649	.1398	.4055	.5646	.5601	.1668	.3519
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .005	P= .195	P= .441	P= .015	P= .014	P= .126	P= .000	P= .000	P= .000	P= .085	P= .002
ARSS	-.0029	-.1293	-.0590	-.1294	.5499	.2760	.0076	.1451	.0127	-.0478	.8369
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .490	P= .145	P= .315	P= .145	P= .000	P= .011	P= .475	P= .117	P= .459	P= .348	P= .000
WKSS	.4145	-.2256	-.0592	.2526	.2379	.1672	.3642	.9227	.4148	.1958	.6546
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .000	P= .031	P= .314	P= .018	P= .024	P= .085	P= .001	P= .000	P= .000	P= .053	P= .000

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- - - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - - -

	PCSS	NDSS	CSSS	ASSS	MKSS	MCSS	EISS	VERB	MECH	ADMIN	GEN
PCSS	1.0000 (69) P= .	-.1162 (69) P= .171	.0240 (69) P= .422	.1104 (69) P= .183	.1544 (69) P= .103	.0427 (69) P= .364	.4096 (69) P= .000	.7239 (69) P= .000	.1938 (69) P= .055	.2245 (69) P= .032	.3983 (69) P= .000
NDSS	-.1162 (69) P= .171	1.0000 (69) P= .	.6460 (69) P= .000	.0282 (69) P= .409	.0462 (69) P= .353	.0833 (69) P= .248	-.0450 (69) P= .357	-.2262 (69) P= .031	.0096 (69) P= .469	.8121 (69) P= .000	-.2229 (69) P= .033
CSSS	.0240 (69) P= .422	.6460 (69) P= .000	1.0000 (69) P= .	.1274 (69) P= .149	.0901 (69) P= .231	.2434 (69) P= .022	-.0779 (69) P= .262	-.0408 (69) P= .370	.1684 (69) P= .083	.8695 (69) P= .000	-.0672 (69) P= .292
ASSS	.1104 (69) P= .183	.0282 (69) P= .409	.1274 (69) P= .149	1.0000 (69) P= .	-.1260 (69) P= .151	.3957 (69) P= .000	.5575 (69) P= .000	.2247 (69) P= .032	.8991 (69) P= .000	.1684 (69) P= .083	.0264 (69) P= .415
MKSS	.1544 (69) P= .103	.0462 (69) P= .353	.0901 (69) P= .231	-.1260 (69) P= .151	1.0000 (69) P= .	.2033 (69) P= .047	.1523 (69) P= .106	.2395 (69) P= .024	.0644 (69) P= .300	.1647 (69) P= .088	.5486 (69) P= .000
MCSS	.0427 (69) P= .364	.0833 (69) P= .248	.2434 (69) P= .022	.3957 (69) P= .000	.2033 (69) P= .047	1.0000 (69) P= .	.2461 (69) P= .021	.1383 (69) P= .128	.6257 (69) P= .000	.2269 (69) P= .030	.2854 (69) P= .009
EISS	.4096 (69) P= .000	-.0450 (69) P= .357	-.0779 (69) P= .262	.5575 (69) P= .000	.1523 (69) P= .106	.2461 (69) P= .021	1.0000 (69) P= .	.4407 (69) P= .000	.5963 (69) P= .000	.1028 (69) P= .200	.2495 (69) P= .019
VERB	.7239 (69) P= .000	-.2262 (69) P= .031	-.0408 (69) P= .370	.2247 (69) P= .032	.2395 (69) P= .024	.1383 (69) P= .128	.4407 (69) P= .000	1.0000 (69) P= .	.3873 (69) P= .001	.2347 (69) P= .026	.6630 (69) P= .000
MECH	.1938 (69) P= .055	.0096 (69) P= .469	.1684 (69) P= .083	.8991 (69) P= .000	.0644 (69) P= .300	.6257 (69) P= .000	.5963 (69) P= .000	.3873 (69) P= .001	1.0000 (69) P= .	.2417 (69) P= .023	.2239 (69) P= .032
ADMIN	.2245 (69) P= .032	.8121 (69) P= .000	.8695 (69) P= .000	.1684 (69) P= .083	.1647 (69) P= .088	.2269 (69) P= .030	.1028 (69) P= .200	.2347 (69) P= .026	.2417 (69) P= .023	1.0000 (69) P= .	.0937 (69) P= .222
GEN	.3983 (69) P= .000	-.2229 (69) P= .033	-.0672 (69) P= .292	.0264 (69) P= .415	.5486 (69) P= .000	.2854 (69) P= .009	.2495 (69) P= .019	.6630 (69) P= .000	.2239 (69) P= .032	.0937 (69) P= .222	1.0000 (69) P= .

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- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	PCSS	NOSS	CSSS	ASSS	MKSS	MCSS	EISS	VERB	MECH	ADMIN	GEN
ELEC	.3473 (69) P= .002	-.0803 (69) P= .256	-.0118 (69) P= .462	.2399 (69) P= .024	.7477 (69) P= .000	.3316 (69) P= .003	.6428 (69) P= .000	.5312 (69) P= .000	.4826 (69) P= .000	.1522 (69) P= .106	.7343 (69) P= .000
AFQT	.4358 (69) P= .000	.2259 (69) P= .031	.2170 (69) P= .037	.1162 (69) P= .171	.5400 (69) P= .000	.3099 (69) P= .005	.3045 (69) P= .005	.6710 (69) P= .000	.3017 (69) P= .006	.4971 (69) P= .000	.8797 (69) P= .000
PTOTAL	.2707 (69) P= .012	.0240 (69) P= .422	.2440 (69) P= .022	.4499 (69) P= .000	.1187 (69) P= .166	.3882 (69) P= .000	.2775 (69) P= .010	.2382 (69) P= .024	.4828 (69) P= .000	.2322 (69) P= .027	.2434 (69) P= .022
PTR100A	.2807 (69) P= .010	.0966 (69) P= .215	.3421 (69) P= .002	.4338 (69) P= .000	.1066 (69) P= .194	.4014 (69) P= .000	.3039 (69) P= .006	.2569 (69) P= .017	.4699 (69) P= .000	.3314 (69) P= .003	.2411 (69) P= .023
PTR50A	.1997 (69) P= .050	.1677 (69) P= .084	.3214 (69) P= .004	.3469 (69) P= .002	.1281 (69) P= .147	.3421 (69) P= .002	.2414 (69) P= .023	.1339 (69) P= .136	.3652 (69) P= .001	.3133 (69) P= .004	.1733 (69) P= .077
PTR25A	.1142 (69) P= .175	.0628 (69) P= .304	.1579 (69) P= .098	.2611 (69) P= .015	.2306 (69) P= .028	.2593 (69) P= .016	.3064 (69) P= .005	.1160 (69) P= .171	.3117 (69) P= .005	.1621 (69) P= .092	.1521 (69) P= .106
PTR12A	.2369 (69) P= .025	.2043 (69) P= .046	.4163 (69) P= .000	.2092 (69) P= .042	.0702 (69) P= .283	.3118 (69) P= .005	.0308 (69) P= .401	.1056 (69) P= .194	.2361 (69) P= .025	.3726 (69) P= .001	.1789 (69) P= .071
PTR6A	.1795 (69) P= .070	-.1193 (69) P= .164	.1122 (69) P= .179	.1582 (69) P= .097	.0191 (69) P= .438	-.0197 (69) P= .436	.1572 (69) P= .098	.1736 (69) P= .077	.1236 (69) P= .156	.0582 (69) P= .317	.0888 (69) P= .234
PTJ100A	.2275 (69) P= .030	.0376 (69) P= .379	.2356 (69) P= .026	.4522 (69) P= .000	.1113 (69) P= .181	.4586 (69) P= .000	.3456 (69) P= .002	.2558 (69) P= .017	.5031 (69) P= .000	.2422 (69) P= .022	.2248 (69) P= .032
PTJ50A	.2125 (69) P= .040	.1144 (69) P= .175	.2862 (69) P= .009	.3755 (69) P= .001	-.0195 (69) P= .437	.2916 (69) P= .008	.1663 (69) P= .083	.0883 (69) P= .235	.3677 (69) P= .001	.2471 (69) P= .020	.0608 (69) P= .310
PTJ25A	.1061 (69) P= .193	-.0137 (69) P= .455	.1400 (69) P= .126	.3486 (69) P= .002	.0472 (69) P= .350	.2241 (69) P= .032	.1866 (69) P= .060	.0682 (69) P= .289	.3444 (69) P= .002	.0916 (69) P= .227	.1562 (69) P= .100

(COEFFICIENT / (CASES) / SIGNIFICANCE)   " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

02 MAR 90 S9772: JOB KNOWLEDGE TEST SCORE ANALYSIS
13:22:07 CORRELATION MATRIX AS PER AMENDMENT 4 PARAGRAPH 1

- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	PCSS	NDSS	CSSS	ASSS	MKSS	MCSS	EISS	VERB	MECH	ADMIN	GEN
PTJ12A	.0471 (69) P= .350	.1063 (69) P= .195	.3018 (69) P= .006	.2833 (69) P= .014	.1061 (69) P= .195	.3443 (69) P= .002	.2239 (69) P= .032	.0081 (69) P= .474	.3421 (69) P= .002	.2199 (69) P= .035	-.0158 (69) P= .449
PTJ6A	.0312 (69) P= .399	.2840 (69) P= .009	.2989 (69) P= .006	.2326 (69) P= .027	.1320 (69) P= .140	.2448 (69) P= .021	.1596 (69) P= .095	-.0317 (69) P= .398	.1811 (69) P= .068	.3034 (69) P= .006	.0875 (69) P= .237
PNOVICE	.5064 (23) P= .007	.0729 (23) P= .370	.3967 (23) P= .030	.5768 (23) P= .002	-.2116 (23) P= .166	.2928 (23) P= .087	.2739 (23) P= .103	.1656 (23) P= .225	.5127 (23) P= .006	.3334 (23) P= .060	.0956 (23) P= .332
NTR100A	.4397 (23) P= .018	.2329 (23) P= .142	.5581 (23) P= .003	.5690 (23) P= .002	-.2668 (23) P= .109	.3696 (23) P= .041	.3074 (23) P= .077	.1203 (23) P= .292	.5166 (23) P= .006	.5018 (23) P= .007	.0376 (23) P= .432
NTR50A	.3589 (23) P= .046	.3398 (23) P= .056	.6150 (23) P= .001	.4463 (23) P= .016	-.2442 (23) P= .131	.1637 (23) P= .228	.2947 (23) P= .086	.0350 (23) P= .437	.3526 (23) P= .049	.5648 (23) P= .002	-.0499 (23) P= .411
NTR25A	.2538 (23) P= .121	.2590 (23) P= .116	.3541 (23) P= .049	.5350 (23) P= .004	-.0551 (23) P= .401	.1534 (23) P= .242	.4553 (23) P= .014	.0942 (23) P= .334	.5370 (23) P= .004	.3865 (23) P= .034	-.1558 (23) P= .239
NTR12A	.2827 (23) P= .095	.2626 (23) P= .113	.5579 (23) P= .003	.2714 (23) P= .105	-.2725 (23) P= .104	.2688 (23) P= .107	-.0699 (23) P= .376	-.1305 (23) P= .276	.1946 (23) P= .187	.4297 (23) P= .020	-.0661 (23) P= .382
NTR6A	.3377 (23) P= .057	-.0455 (23) P= .418	.0755 (23) P= .366	.0866 (23) P= .347	-.2445 (23) P= .130	-.1876 (23) P= .196	-.0032 (23) P= .494	.1959 (23) P= .185	.0334 (23) P= .440	.0884 (23) P= .344	.1556 (23) P= .239
NTJ100A	.4155 (23) P= .024	.2067 (23) P= .172	.5575 (23) P= .003	.6012 (23) P= .001	-.1919 (23) P= .190	.4520 (23) P= .015	.3128 (23) P= .073	.1156 (23) P= .300	.5516 (23) P= .003	.4852 (23) P= .009	.0795 (23) P= .359
NTJ50A	.3685 (23) P= .043	.2248 (23) P= .151	.4185 (23) P= .023	.4463 (23) P= .016	-.2820 (23) P= .096	.2010 (23) P= .179	.1330 (23) P= .273	-.0413 (23) P= .426	.3320 (23) P= .061	.3578 (23) P= .047	-.0091 (23) P= .484
NTJ25A	.4740 (23) P= .011	.0190 (23) P= .466	.3473 (23) P= .052	.5439 (23) P= .004	-.4433 (23) P= .017	.3129 (23) P= .073	.1512 (23) P= .245	.0881 (23) P= .345	.4310 (23) P= .020	.2470 (23) P= .128	.0768 (23) P= .364

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- - - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - - -

	PCSS	NOSS	CSSS	ASSS	MKSS	MCSS	EISS	VERB	MECH	ADMIN	GEN
NTJ12A	.2961 (23) P= .085	.0424 (23) P= .424	.3459 (23) P= .053	.2665 (23) P= .109	-.0464 (23) P= .417	.3207 (23) P= .068	.1473 (23) P= .251	-.1102 (23) P= .308	.2997 (23) P= .082	.1892 (23) P= .194	.0319 (23) P= .442
NTJ6A	.0944 (23) P= .334	.2695 (23) P= .107	.3251 (23) P= .065	.0824 (23) P= .354	-.1982 (23) P= .182	-.0747 (23) P= .367	.1363 (23) P= .267	-.0414 (23) P= .426	-.0016 (23) P= .497	.3274 (23) P= .063	-.1338 (23) P= .271
PMASTER	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTR100A	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTR50A	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTR25A	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTR12A	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTR6A	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTJ100A	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTJ50A	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTJ25A	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .

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02 MAR 90 S9772: JOB KNOWLEDGE TEST SCORE ANALYSIS
13:22:08 CORRELATION MATRIX AS PER AMENDMENT 4 PARAGRAPH 1

- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	PCSS	MOSS	CSSS	ASSS	MKSS	MCSS	EISS	VERB	MECH	ADMIN	GEN
MTJ12A	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MTJ6A	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .

(COEFFICIENT / (CASES) / SIGNIFICANCE) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	ELEC	AFQT	PTOTAL	PTR100A	PTR50A	PTR25A
MEANSELF	.1633 (69) P= .090	.0858 (69) P= .241	.4844 (293) P= .000	.4519 (293) P= .000	.4871 (293) P= .000	.3750 (293) P= .000
MEANSUP	.1904 (69) P= .059	-.0313 (69) P= .398	.4401 (294) P= .000	.3986 (294) P= .000	.3157 (294) P= .000	.2857 (294) P= .000
MEANEXP	.0349 (69) P= .388	-.0703 (69) P= .283	.3677 (292) P= .000	.3492 (292) P= .000	.3784 (292) P= .000	.2328 (292) P= .000
FGRADE	.2346 (67) P= .028	.0901 (67) P= .234	.1934 (79) P= .044	.2243 (79) P= .023	.1616 (79) P= .077	.2247 (79) P= .023
PHITS	.4642 (69) P= .000	.2040 (69) P= .046	.4139 (81) P= .000	.3921 (81) P= .000	.3705 (81) P= .000	.2775 (81) P= .006
TRSEA	.0994 (68) P= .210	.0247 (68) P= .421	.2474 (80) P= .013	.2612 (80) P= .010	.2769 (80) P= .006	.0792 (80) P= .242
TRSUA	.1637 (68) P= .091	-.0506 (68) P= .341	.0903 (80) P= .213	.1598 (80) P= .078	.0665 (80) P= .279	-.0029 (80) P= .490
TRPEA	.1102 (68) P= .185	-.0602 (68) P= .313	.2342 (80) P= .018	.2450 (80) P= .014	.1401 (80) P= .108	.1067 (80) P= .173
GSSS	.6411 (69) P= .000	.3768 (69) P= .001	.1598 (69) P= .095	.1426 (69) P= .121	.0634 (69) P= .302	.1554 (69) P= .101
ARSS	.5821 (69) P= .000	.6721 (69) P= .000	.1478 (69) P= .113	.1308 (69) P= .142	.1311 (69) P= .141	.1162 (69) P= .171
WKSS	.5114 (69) P= .000	.6558 (69) P= .000	.1799 (69) P= .070	.1946 (69) P= .055	.0688 (69) P= .287	.1017 (69) P= .203

	PTR12A	PTR6A	PTJ100A	PTJ50A	PTJ25A
MEANSELF	.3017 (293) P= .000	.2923 (293) P= .000	.4148 (293) P= .000	.4224 (293) P= .000	.3597 (293) P= .000
MEANSUP	.2409 (294) P= .000	.2441 (294) P= .000	.3902 (294) P= .000	.3674 (294) P= .000	.3298 (294) P= .000
MEANEXP	.1982 (292) P= .000	.2617 (292) P= .000	.3065 (292) P= .000	.3425 (292) P= .000	.3007 (292) P= .000
FGRADE	.0607 (79) P= .298	.0471 (79) P= .340	.2058 (79) P= .034	.1937 (79) P= .044	.0652 (79) P= .284
PHITS	.2204 (81) P= .024	.1445 (81) P= .099	.3498 (81) P= .001	.3177 (81) P= .002	.3031 (81) P= .003
TRSEA	.2528 (80) P= .012	.2690 (80) P= .008	.2194 (80) P= .025	.1984 (80) P= .039	.2447 (80) P= .014
TRSUA	.1090 (80) P= .168	.0714 (80) P= .264	.1722 (80) P= .063	.0190 (80) P= .434	.0029 (80) P= .490
TRPEA	.1844 (80) P= .051	.1036 (80) P= .180	.2699 (80) P= .008	.1786 (80) P= .056	.0358 (80) P= .376
GSSS	-.0104 (69) P= .466	.0608 (69) P= .310	.1513 (69) P= .107	.0579 (69) P= .318	.1054 (69) P= .194
ARSS	.1592 (69) P= .096	-.0096 (69) P= .469	.1101 (69) P= .184	.0157 (69) P= .449	.1566 (69) P= .099
WKSS	.0185 (69) P= .440	.1301 (69) P= .143	.2301 (69) P= .029	.0053 (69) P= .483	.0478 (69) P= .348

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	ELEC	AFOT	PTOTAL	PTR100A	PTR50A	PTR25A	PTR12A	PTR6A	PTJ100A	PTJ50A	PTJ25A
PCSS	.3473	.4388	.2707	.2807	.1997	.1142	.2369	.1795	.2275	.2125	.1061
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .002	P= .000	P= .012	P= .010	P= .050	P= .175	P= .025	P= .070	P= .030	P= .040	P= .193
NDSS	-.0803	.2259	.0240	.0966	.1677	.0628	.2043	-.1193	.0376	.1144	-.0137
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .256	P= .031	P= .422	P= .215	P= .084	P= .304	P= .046	P= .164	P= .379	P= .175	P= .455
CSSS	-.0118	.2170	.2440	.3421	.3214	.1579	.4163	.1122	.2356	.2852	.1400
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .462	P= .037	P= .022	P= .002	P= .004	P= .098	P= .000	P= .179	P= .026	P= .009	P= .126
ASSS	.2399	.1162	.4499	.4338	.3469	.2611	.2092	.1582	.4522	.3755	.3486
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .024	P= .171	P= .000	P= .000	P= .002	P= .015	P= .042	P= .097	P= .000	P= .001	P= .002
MKSS	.7477	.5400	.1187	.1056	.1281	.2306	.0702	.0191	.1113	-.0195	.0472
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .000	P= .000	P= .166	P= .194	P= .147	P= .028	P= .283	P= .438	P= .181	P= .437	P= .350
MCSS	.3316	.3099	.3882	.4014	.3421	.2593	.3118	-.0197	.4586	.2916	.2241
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .003	P= .005	P= .000	P= .000	P= .002	P= .016	P= .005	P= .436	P= .000	P= .008	P= .032
EISS	.6428	.3045	.2775	.3039	.2414	.3064	.0308	.1572	.3456	.1683	.1886
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .000	P= .005	P= .010	P= .006	P= .023	P= .005	P= .401	P= .098	P= .002	P= .083	P= .060
VERB	.5312	.6710	.2382	.2569	.1339	.1160	.1056	.1736	.2558	.0883	.0682
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .000	P= .000	P= .024	P= .017	P= .136	P= .171	P= .194	P= .077	P= .017	P= .235	P= .289
MECH	.4826	.3017	.4828	.4699	.3652	.3117	.2361	.1236	.5031	.3677	.3444
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .000	P= .006	P= .000	P= .000	P= .001	P= .005	P= .025	P= .156	P= .000	P= .001	P= .002
ADMIN	.1522	.4971	.2322	.3314	.3133	.1621	.3726	.0582	.2422	.2471	.0916
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .106	P= .000	P= .027	P= .003	P= .004	P= .092	P= .001	P= .317	P= .022	P= .020	P= .227
GEN	.7343	.8797	.2434	.2411	.1733	.1521	.1789	.0888	.2248	.0608	.1562
	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)	(69)
	P= .000	P= .000	P= .022	P= .023	P= .077	P= .106	P= .071	P= .234	P= .032	P= .310	P= .100

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	ELEC	AFQT	PTOTAL	PTR100A	PTR50A	PTR25A	PTR12A	PTR6A	PTJ100A	PTJ50A	PTJ25A
ELEC	1.0000 (69) P= .	.7077 (69) P= .000	.2745 (69) P= .011	.2694 (69) P= .013	.2243 (69) P= .032	.3205 (69) P= .004	.0924 (69) P= .225	.0944 (69) P= .220	.2861 (69) P= .009	.0913 (69) P= .228	.1909 (69) P= .058
AFQT	.7077 (69) P= .000	1.0000 (69) P= .	.2862 (69) P= .008	.3116 (69) P= .005	.2612 (69) P= .015	.1810 (69) P= .068	.2714 (69) P= .012	.0702 (69) P= .283	.2745 (69) P= .011	.1279 (69) P= .147	.1584 (69) P= .097
PTOTAL	.2745 (69) P= .011	.2862 (69) P= .008	1.0000 (294) P= .	.9382 (294) P= .000	.8782 (294) P= .000	.7126 (294) P= .000	.6664 (294) P= .000	.5337 (294) P= .000	.9290 (294) P= .000	.8654 (294) P= .000	.7748 (294) P= .000
PTR100A	.2694 (69) P= .013	.3116 (69) P= .005	.9382 (294) P= .000	1.0000 (294) P= .	.8465 (294) P= .000	.6801 (294) P= .000	.6367 (294) P= .000	.5371 (294) P= .000	.8766 (294) P= .000	.8035 (294) P= .000	.7068 (294) P= .000
PTR50A	.2243 (69) P= .032	.2612 (69) P= .015	.8782 (294) P= .000	.8465 (294) P= .000	1.0000 (294) P= .	.6500 (294) P= .000	.5889 (294) P= .000	.5290 (294) P= .000	.8070 (294) P= .000	.7464 (294) P= .000	.6321 (294) P= .000
PTR25A	.3205 (69) P= .004	.1810 (69) P= .068	.7126 (294) P= .000	.6801 (294) P= .000	.6500 (294) P= .000	1.0000 (294) P= .	.4639 (294) P= .000	.3791 (294) P= .000	.6545 (294) P= .000	.6154 (294) P= .000	.5914 (294) P= .000
PTR12A	.0924 (69) P= .225	.2714 (69) P= .012	.6664 (294) P= .000	.6367 (294) P= .000	.5889 (294) P= .000	.4639 (294) P= .000	1.0000 (294) P= .	.3409 (294) P= .000	.6081 (294) P= .000	.5939 (294) P= .000	.5335 (294) P= .000
PTR6A	.0944 (69) P= .220	.0702 (69) P= .283	.5337 (294) P= .000	.5371 (294) P= .000	.5290 (294) P= .000	.3791 (294) P= .000	.3409 (294) P= .000	1.0000 (294) P= .	.5228 (294) P= .000	.4350 (294) P= .000	.4303 (294) P= .000
PTJ100A	.2861 (69) P= .009	.2745 (69) P= .011	.9290 (294) P= .000	.8766 (294) P= .000	.8070 (294) P= .000	.6545 (294) P= .000	.6081 (294) P= .000	.5228 (294) P= .000	1.0000 (294) P= .	.8365 (294) P= .000	.7322 (294) P= .000
PTJ50A	.0913 (69) P= .228	.1279 (69) P= .147	.8654 (294) P= .000	.8035 (294) P= .000	.7464 (294) P= .000	.6154 (294) P= .000	.5939 (294) P= .000	.4350 (294) P= .000	.8365 (294) P= .000	1.0000 (294) P= .	.7097 (294) P= .000
PTJ25A	.1909 (69) P= .058	.1584 (69) P= .097	.7748 (294) P= .000	.7068 (294) P= .000	.6321 (294) P= .000	.5914 (294) P= .000	.5335 (294) P= .000	.4303 (294) P= .000	.7322 (294) P= .000	.7097 (294) P= .000	1.0000 (294) P= .

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	ELEC	AFQT	PTOTAL	PTR100A	PTR50A	PTR25A	PTR12A	PTR6A	PTJ100A	PTJ50A	PTJ25A
PTJ12A	.1877 (69) P= .061	.0483 (69) P= .347	.6591 (294) P= .000	.6373 (294) P= .000	.5722 (294) P= .000	.4682 (294) P= .000	.4081 (294) P= .000	.3414 (294) P= .000	.6117 (294) P= .000	.5335 (294) P= .000	.5161 (294) P= .000
PTJ6A	.1168 (69) P= .170	.2002 (69) P= .050	.5003 (294) P= .000	.4797 (294) P= .000	.4291 (294) P= .000	.2668 (294) P= .000	.3184 (294) P= .000	.2385 (294) P= .000	.4772 (294) P= .000	.4106 (294) P= .000	.3159 (294) P= .000
PNOVICE	.0751 (23) P= .367	.1881 (23) P= .195	1.0000 (111) P=0.0	.9205 (111) P= .000	.8439 (111) P= .000	.6101 (111) P= .000	.5359 (111) P= .000	.4406 (111) P= .000	.8821 (111) P= .000	.7819 (111) P= .000	.7135 (111) P= .000
NTR100A	.0371 (23) P= .433	.2048 (23) P= .174	.9205 (111) P= .000	1.0000 (111) P=0.0	.8248 (111) P= .000	.5605 (111) P= .000	.5048 (111) P= .000	.4371 (111) P= .000	.8003 (111) P= .000	.7148 (111) P= .000	.6052 (111) P= .000
NTR50A	-.0037 (23) P= .493	.1666 (23) P= .224	.8439 (111) P= .000	.8248 (111) P= .000	1.0000 (111) P=0.0	.4841 (111) P= .000	.4515 (111) P= .000	.4841 (111) P= .000	.7509 (111) P= .000	.6885 (111) P= .000	.5419 (111) P= .000
NTR25A	.2883 (23) P= .091	.0585 (23) P= .395	.6101 (111) P= .000	.5605 (111) P= .000	.4841 (111) P= .000	1.0000 (111) P=0.0	.2334 (111) P= .007	.2032 (111) P= .016	.5163 (111) P= .000	.4882 (111) P= .000	.4768 (111) P= .000
NTR12A	-.2690 (23) P= .107	.0490 (23) P= .412	.5359 (111) P= .000	.5048 (111) P= .000	.4515 (111) P= .000	.2334 (111) P= .007	1.0000 (111) P=0.0	.1141 (111) P= .117	.4264 (111) P= .000	.4642 (111) P= .000	.3570 (111) P= .000
NTR6A	-.0607 (23) P= .392	.2006 (23) P= .179	.4406 (111) P= .000	.4371 (111) P= .000	.4841 (111) P= .000	.2032 (111) P= .016	.1141 (111) P= .117	1.0000 (111) P=0.0	.4243 (111) P= .000	.2742 (111) P= .002	.2788 (111) P= .002
NTJ100A	.0783 (23) P= .361	.2005 (23) P= .179	.8821 (111) P= .000	.8003 (111) P= .000	.7509 (111) P= .000	.5163 (111) P= .000	.4264 (111) P= .000	.4243 (111) P= .000	1.0000 (111) P=0.0	.7482 (111) P= .000	.6601 (111) P= .000
NTJ50A	-.1127 (23) P= .304	.1165 (23) P= .298	.7819 (111) P= .000	.7148 (111) P= .000	.6885 (111) P= .000	.4882 (111) P= .000	.4642 (111) P= .000	.2742 (111) P= .002	.7482 (111) P= .000	1.0000 (111) P=0.0	.6119 (111) P= .000
NTJ25A	-.1789 (23) P= .207	.0970 (23) P= .330	.7135 (111) P= .000	.6052 (111) P= .000	.5419 (111) P= .000	.4768 (111) P= .000	.3570 (111) P= .000	.2788 (111) P= .002	.6601 (111) P= .000	.6119 (111) P= .000	1.0000 (111) P=0.0

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	ELEC	AFQT	PTOTAL	PTR100A	PTR50A	PTR25A	PTR12A	PTR6A	PTJ100A	PTJ50A	PTJ25A
NTJ12A	.1412 (23) P= .260	.0163 (23) P= .471	.6104 (111) P= .000	.5389 (111) P= .000	.4801 (111) P= .000	.3246 (111) P= .000	.3185 (111) P= .000	.2333 (111) P= .007	.5687 (111) P= .000	.4289 (111) P= .000	.4779 (111) P= .000
NTJ6A	-.1272 (23) P= .281	.0082 (23) P= .485	.4119 (111) P= .000	.4133 (111) P= .000	.3603 (111) P= .000	.1735 (111) P= .034	.2590 (111) P= .003	.1120 (111) P= .121	.4052 (111) P= .000	.3129 (111) P= .000	.2191 (111) P= .010
PMASTER	. (1) P= .	. (1) P= .	1.0000 (51) P=0.0	.9012 (51) P= .000	.8414 (51) P= .000	.5621 (51) P= .000	.7663 (51) P= .000	.5717 (51) P= .000	.9319 (51) P= .000	.8377 (51) P= .000	.6718 (51) P= .000
MTR100A	. (1) P= .	. (1) P= .	.9012 (51) P= .000	1.0000 (51) P=0.0	.7979 (51) P= .000	.5512 (51) P= .000	.7180 (51) P= .000	.5896 (51) P= .000	.8489 (51) P= .000	.7294 (51) P= .000	.5937 (51) P= .000
MTR50A	. (1) P= .	. (1) P= .	.8414 (51) P= .000	.7979 (51) P= .000	1.0000 (51) P=0.0	.4597 (51) P= .000	.7008 (51) P= .000	.6036 (51) P= .000	.7631 (51) P= .000	.5927 (51) P= .000	.5529 (51) P= .000
MTR25A	. (1) P= .	. (1) P= .	.5621 (51) P= .000	.5512 (51) P= .000	.4597 (51) P= .000	1.0000 (51) P=0.0	.4823 (51) P= .000	.4653 (51) P= .000	.6165 (51) P= .000	.5212 (51) P= .000	.4502 (51) P= .000
MTR12A	. (1) P= .	. (1) P= .	.7663 (51) P= .000	.7180 (51) P= .000	.7008 (51) P= .000	.4823 (51) P= .000	1.0000 (51) P=0.0	.4385 (51) P= .001	.7269 (51) P= .000	.5829 (51) P= .000	.5179 (51) P= .000
MTR6A	. (1) P= .	. (1) P= .	.5717 (51) P= .000	.5896 (51) P= .000	.6035 (51) P= .000	.4653 (51) P= .000	.4385 (51) P= .001	1.0000 (51) P=0.0	.5912 (51) P= .000	.4811 (51) P= .000	.5308 (51) P= .000
MTJ100A	. (1) P= .	. (1) P= .	.9319 (51) P= .000	.8489 (51) P= .000	.7631 (51) P= .000	.6165 (51) P= .000	.7269 (51) P= .000	.5912 (51) P= .000	1.0000 (51) P=0.0	.8467 (51) P= .000	.6951 (51) P= .000
MTJ50A	. (1) P= .	. (1) P= .	.8377 (51) P= .000	.7294 (51) P= .000	.5927 (51) P= .000	.5212 (51) P= .000	.5829 (51) P= .000	.4811 (51) P= .000	.8467 (51) P= .000	1.0000 (51) P=0.0	.6463 (51) P= .000
MTJ25A	. (1) P= .	. (1) P= .	.6718 (51) P= .000	.5937 (51) P= .000	.5529 (51) P= .000	.4502 (51) P= .000	.5179 (51) P= .000	.5308 (51) P= .000	.6951 (51) P= .000	.6463 (51) P= .000	1.0000 (51) P=0.0

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	ELEC	AFQT	PTOTAL	PTR100A	PTR50A	PTR25A	PTR12A	PTR6A	PTJ100A	PTJ50A	PTJ25A
MTJ12A	.	.	.5294	.5732	.4896	.4036	.5332	.2910	.4787	.3450	.1404
	(1)	(1)	(51)	(51)	(51)	(51)	(51)	(51)	(51)	(51)	(51)
	P= .	P= .	P= .000	P= .000	P= .000	P= .002	P= .000	P= .019	P= .000	P= .007	P= .163
MTJ6A	.	.	.3601	.3837	.2747	.2419	.2936	.1732	.2483	.1627	.1005
	(1)	(1)	(51)	(51)	(51)	(51)	(51)	(51)	(51)	(51)	(51)
	P= .	P= .	P= .006	P= .003	P= .025	P= .044	P= .018	P= .112	P= .039	P= .127	P= .241

(COEFFICIENT / (CASES) / SIGNIFICANCE) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

	PTJ12A	PTJ6A	PNOVICE	NTR100A	NTR50A	NTR25A	NTR12A	NTR6A	NTJ100A	NTJ50A	NTJ25A
MEANSELF	.3412 (293) P= .000	.3009 (293) P= .000	.3150 (110) P= .000	.2816 (110) P= .001	.3205 (110) P= .000	.1915 (110) P= .023	.1810 (110) P= .029	.1408 (110) P= .071	.2280 (110) P= .008	.2784 (110) P= .002	.1682 (110) P= .040
MEANSUP	.3064 (294) P= .000	.3346 (294) P= .000	.2628 (111) P= .003	.2044 (111) P= .016	.0796 (111) P= .203	.1132 (111) P= .118	.0739 (111) P= .220	.1831 (111) P= .027	.1996 (111) P= .018	.1296 (111) P= .088	.1349 (111) P= .079
MEANEXP	.2380 (292) P= .000	.2152 (292) P= .000	.2247 (109) P= .009	.2123 (109) P= .013	.2192 (109) P= .011	.0516 (109) P= .297	.1284 (109) P= .092	.1494 (109) P= .061	.1675 (109) P= .041	.2226 (109) P= .010	.1430 (109) P= .069
FGRADE	.1066 (79) P= .175	.0387 (79) P= .368	.1168 (24) P= .293	.1817 (24) P= .198	.0015 (24) P= .497	.1297 (24) P= .273	-.1398 (24) P= .257	.0387 (24) P= .429	.1497 (24) P= .242	.1100 (24) P= .304	.1552 (24) P= .234
PHITS	.3950 (81) P= .000	.1256 (81) P= .132	.3243 (24) P= .061	.3533 (24) P= .045	.2849 (24) P= .088	.4312 (24) P= .018	.0773 (24) P= .360	.1025 (24) P= .317	.3219 (24) P= .062	.2555 (24) P= .114	.1905 (24) P= .186
TRSEA	.2103 (80) P= .031	.2477 (80) P= .013	.1881 (23) P= .195	.3046 (23) P= .079	.1723 (23) P= .216	.1191 (23) P= .294	.4022 (23) P= .028	.1057 (23) P= .316	.1995 (23) P= .181	.1873 (23) P= .196	.0761 (23) P= .365
TRSUA	.1356 (80) P= .115	.1917 (80) P= .044	-.1174 (23) P= .297	-.0011 (23) P= .498	-.0988 (23) P= .327	.0987 (23) P= .327	-.1450 (23) P= .254	-.0283 (23) P= .449	-.0421 (23) P= .424	-.2473 (23) P= .127	-.1723 (23) P= .216
TRPEA	.3044 (80) P= .003	.0606 (80) P= .297	.0004 (23) P= .499	.0815 (23) P= .356	-.0701 (23) P= .375	.0444 (23) P= .420	.0165 (23) P= .470	-.1840 (23) P= .200	-.0061 (23) P= .489	-.0485 (23) P= .413	-.3034 (23) P= .080
GSSS	.1641 (69) P= .089	-.1610 (69) P= .093	.0443 (23) P= .420	.0074 (23) P= .487	-.0491 (23) P= .412	.3373 (23) P= .058	-.2404 (23) P= .134	.0729 (23) P= .370	-.0283 (23) P= .449	-.1442 (23) P= .256	-.1553 (23) P= .240
ARSS	-.0268 (69) P= .413	.1389 (69) P= .127	-.0133 (23) P= .476	-.0432 (23) P= .422	-.0767 (23) P= .364	-.2289 (23) P= .147	.0202 (23) P= .464	.0289 (23) P= .448	.0042 (23) P= .492	.0188 (23) P= .466	.0203 (23) P= .463
WKSS	-.0153 (69) P= .450	-.0577 (69) P= .318	-.0298 (23) P= .446	-.0445 (23) P= .420	-.1301 (23) P= .277	-.0012 (23) P= .498	-.2933 (23) P= .087	.0794 (23) P= .359	-.0440 (23) P= .421	-.2101 (23) P= .168	-.1022 (23) P= .321

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- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	PTJ12A	PTJ6A	PNOVICE	NTR100A	NTR50A	NTR25A	NTR12A	NTR6A	NTJ100A	NTJ50A	NTJ25A
PCSS	.0471	.0312	.5084	.4397	.3589	.2538	.2827	.3377	.4155	.3655	.4740
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .350	P= .399	P= .007	P= .018	P= .046	P= .121	P= .095	P= .057	P= .024	P= .043	P= .011
NDSS	.1053	.2840	.0729	.2329	.3398	.2590	.2625	-.0455	.2067	.2248	.0190
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .195	P= .009	P= .370	P= .142	P= .056	P= .116	P= .113	P= .418	P= .172	P= .151	P= .466
CSSS	.3018	.2989	.3967	.5581	.6150	.3541	.5579	.0755	.5575	.4185	.3473
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .006	P= .006	P= .030	P= .003	P= .001	P= .049	P= .003	P= .366	P= .003	P= .023	P= .052
ASSS	.2633	.2326	.5768	.5890	.4463	.5350	.2714	.0866	.6012	.4453	.5439
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .014	P= .027	P= .002	P= .002	P= .016	P= .004	P= .105	P= .347	P= .001	P= .016	P= .004
MKSS	.1051	.1320	-.2116	-.2668	-.2442	-[illegible]651	-.2725	-.2445	-.1919	-.2820	-.4433
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .195	P= .140	P= .166	P= .109	P= .131	P= .401	P= .104	P= .130	P= .190	P= .098	P= .017
MCSS	.3443	.2448	.2928	.3696	.1637	.1534	.2688	-.1876	.4520	.2010	.3129
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .002	P= .021	P= .087	P= .041	P= .228	P= .242	P= .107	P= .195	P= .015	P= .179	P= .073
EISS	.2239	.1596	.2739	.3074	.2947	.4553	-.0699	-.0032	.3128	.1330	.1512
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .032	P= .095	P= .103	P= .077	P= .086	P= .014	P= .376	P= .494	P= .073	P= .273	P= .245
VERB	.0081	-.0317	.1656	.1203	.0350	.0942	-.1305	.1959	.1156	-.0413	.0881
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .474	P= .398	P= .225	P= .292	P= .437	P= .334	P= .276	P= .185	P= .300	P= .426	P= .345
MECH	.3421	.1811	.5127	.5168	.3526	.5370	.1946	.0334	.5516	.3320	.4310
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .002	P= .068	P= .006	P= .006	P= .049	P= .004	P= .187	P= .440	P= .003	P= .061	P= .020
ADMIN	.2199	.3034	.3334	.5018	.5648	.3865	.4297	.0884	.4852	.3578	.2470
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .035	P= .006	P= .060	P= .007	P= .002	P= .034	P= .020	P= .344	P= .009	P= .047	P= .128
GEN	-.0158	.0875	.0956	.0376	-.0499	-.1558	-.0661	.1556	.0795	-.0091	.0768
	(69)	(69)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
	P= .449	P= .237	P= .332	P= .432	P= .411	P= .239	P= .382	P= .239	P= .359	P= .484	P= .364

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	PTJ12A	PTJ6A	PNOVICE	NTR100A	NTR50A	NTR25A	NTR12A	NTR6A	NTJ100A	NTJ50A	NTJ25A
ELEC	.1877 (69) P= .061	.1168 (69) P= .170	.0751 (23) P= .367	.0371 (23) P= .433	-.0037 (23) P= .493	.2883 (23) P= .091	-.2690 (23) P= .107	-.0607 (23) P= .392	.0783 (23) P= .361	-.1127 (23) P= .304	-.1789 (23) P= .207
AFQT	.0483 (69) P= .347	.2002 (69) P= .050	.1881 (23) P= .196	.2048 (23) P= .174	.1666 (23) P= .224	.0585 (23) P= .396	.0490 (23) P= .412	.2006 (23) P= .179	.2005 (23) P= .179	.1165 (23) P= .298	.0970 (23) P= .330
PTOTAL	.6591 (294) P= .000	.5003 (294) P= .000	1.0000 (111) P=0.0	.9205 (111) P= .000	.8439 (111) P= .000	.6101 (111) P= .000	.5359 (111) P= .000	.4406 (111) P= .000	.8821 (111) P= .000	.7819 (111) P= .000	.7135 (111) P= .000
PTR100A	.6373 (294) P= .000	.4797 (294) P= .000	.9206 (111) P= .000	1.0000 (111) P=0.0	.8248 (111) P= .000	.5605 (111) P= .000	.5048 (111) P= .000	.4371 (111) P= .000	.8003 (111) P= .000	.7148 (111) P= .000	.6052 (111) P= .000
PTR50A	.5722 (294) P= .000	.4291 (294) P= .000	.8439 (111) P= .000	.8248 (111) P= .000	1.0000 (111) P=0.0	.4841 (111) P= .000	.4515 (111) P= .000	.4841 (111) P= .000	.7509 (111) P= .000	.6885 (111) P= .000	.5419 (111) P= .000
PTR25A	.4682 (294) P= .000	.2668 (294) P= .000	.6101 (111) P= .000	.5605 (111) P= .000	.4841 (111) P= .000	1.0000 ([illegible]1) P=0.0	.2334 (111) P= .007	.2032 (111) P= .016	.5163 (111) P= .000	.4882 (111) P= .000	.4768 (111) P= .000
PTR12A	.4081 (294) P= .000	.3184 (294) P= .000	.5359 (111) P= .000	.5048 (111) P= .000	.4515 (111) P= .000	.2334 (111) P= .007	1.0000 (111) P=0.0	.1141 (111) P= .117	.4264 (111) P= .000	.4642 (111) P= .000	.3570 (111) P= .000
PTR6A	.3414 (294) P= .000	.2385 (294) P= .000	.4406 (111) P= .000	.4371 (111) P= .000	.4841 (111) P= .000	.2032 (111) P= .016	.1141 (111) P= .117	1.0000 (111) P=0.0	.4243 (111) P= .000	.2742 (111) P= .002	.2788 (111) P= .002
PTJ100A	.6117 (294) P= .000	.4772 (294) P= .000	.8821 (111) P= .000	.8003 (111) P= .000	.7509 (111) P= .000	.5163 (111) P= .000	.4264 (111) P= .000	.4243 (111) P= .000	1.0000 (111) P=0.0	.7482 (111) P= .000	.6601 (111) P= .000
PTJ50A	.5335 (294) P= .000	.4106 (294) P= .000	.7819 (111) P= .000	.7148 (111) P= .000	.6885 (111) P= .000	.4882 (111) P= .000	.4642 (111) P= .000	.2742 (111) P= .002	.7482 (111) P= .000	1.0000 (111) P=0.0	.6119 (111) P= .000
PTJ25A	.5161 (294) P= .000	.3159 (294) P= .000	.7135 (111) P= .000	.6052 (111) P= .000	.5419 (111) P= .000	.4768 (111) P= .000	.3570 (111) P= .000	.2788 (111) P= .002	.6601 (111) P= .000	.6119 (111) P= .000	1.0000 (111) P=0.0

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	PTJ12A	PTJ6A	PNOVICE	NTR100A	NTR50A	NTR25A	NTR12A	NTR6A	NTJ100A	NTJ50A	NTJ25A
PTJ12A	1.0000 (294) P= .	.3483 (294) P= .000	.6104 (111) P= .000	.5389 (111) P= .000	.4801 (111) P= .000	.3246 (111) P= .000	.3185 (111) P= .000	.2333 (111) P= .007	.5667 (111) P= .000	.4289 (111) P= .000	.4779 (111) P= .000
PTJ6A	.3483 (294) P= .000	1.0000 (294) P= .	.4119 (111) P= .000	.4133 (111) P= .000	.3603 (111) P= .000	.1735 (111) P= .034	.2590 (111) P= .003	.1120 (111) P= .121	.4052 (111) P= .000	.3129 (111) P= .000	.2191 (111) P= .010
PNOVICE	.6104 (111) P= .000	.4119 (111) P= .000	1.0000 (111) P= .	.9205 (111) P= .000	.8439 (111) P= .000	.6101 (111) P= .000	.5359 (111) P= .000	.4406 (111) P= .000	.8821 (111) P= .000	.7819 (111) P= .000	.7135 (111) P= .000
NTR100A	.5389 (111) P= .000	.4133 (111) P= .000	.9205 (111) P= .000	1.0000 (111) P= .	.8248 (111) P= .000	.5605 (111) P= .000	.5048 (111) P= .000	.4371 (111) P= .000	.8003 (111) P= .000	.7148 (111) P= .000	.6052 (111) P= .000
NTR50A	.4801 (111) P= .000	.3603 (111) P= .000	.8439 (111) P= .000	.8248 (111) P= .000	1.0000 (111) P= .	.4841 (111) P= .000	.4515 (111) P= .000	.4841 (111) P= .000	.7509 (111) P= .000	.6885 (111) P= .000	.5419 (111) P= .000
NTR25A	.3246 (111) P= .000	.1735 (111) P= .034	.6101 (111) P= .000	.5605 (111) P= .000	.4841 (111) P= .000	1.0000 (111) P= .	.2334 (111) P= .007	.2032 (111) P= .016	.5163 (111) P= .000	.4882 (111) P= .000	.4768 (111) P= .000
NTR12A	.3185 (111) P= .000	.2590 (111) P= .003	.5359 (111) P= .000	.5048 (111) P= .000	.4515 (111) P= .000	.2334 (111) P= .007	1.0000 (111) P= .	.1141 (111) P= .117	.4264 (111) P= .000	.4642 (111) P= .000	.3570 (111) P= .000
NTR6A	.2333 (111) P= .007	.1120 (111) P= .121	.4406 (111) P= .000	.4371 (111) P= .000	.4841 (111) P= .000	.2032 (111) P= .016	.1141 (111) P= .117	1.0000 (111) P= .	.4243 (111) P= .000	.2742 (111) P= .002	.2788 (111) P= .002
NTJ100A	.5667 (111) P= .000	.4052 (111) P= .000	.8821 (111) P= .000	.8003 (111) P= .000	.7509 (111) P= .000	.5163 (111) P= .000	.4264 (111) P= .000	.4243 (111) P= .000	1.0000 (111) P= .	.7482 (111) P= .000	.6601 (111) P= .000
NTJ50A	.4289 (111) P= .000	.3129 (111) P= .000	.7819 (111) P= .000	.7148 (111) P= .000	.6885 (111) P= .000	.4882 (111) P= .000	.4642 (111) P= .000	.2742 (111) P= .002	.7482 (111) P= .000	1.0000 (111) P= .	.6119 (111) P= .000
NTJ25A	.4779 (111) P= .000	.2191 (111) P= .010	.7135 (111) P= .000	.6052 (111) P= .000	.5419 (111) P= .000	.4768 (111) P= .000	.3570 (111) P= .000	.2788 (111) P= .002	.6601 (111) P= .000	.6119 (111) P= .000	1.0000 (111) P= .

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	PTJ12A	PTJ6A	PNOVICE	NTR100A	NTR50A	NTR25A	NTR12A	NTR6A	NTJ100A	NTJ50A	NTJ25A
NTJ12A	1.0000 (111) P=0.0	.2870 (111) P= .001	.6104 (111) P= .000	.5389 (111) P= .000	.4801 (111) P= .000	.3246 (111) P= .000	.3165 (111) P= .000	.2333 (111) P= .007	.5687 (111) P= .000	.4289 (111) P= .000	.4779 (111) P= .000
NTJ6A	.2870 (111) P= .001	1.0000 (111) P=0.0	.4119 (111) P= .000	.4133 (111) P= .000	.3603 (111) P= .000	.1735 (111) P= .034	.2590 (111) P= .003	.1120 (111) P= .121	.4052 (111) P= .000	.3129 (111) P= .000	.2191 (111) P= .010
PMASTER	.5294 (51) P= .000	.3601 (51) P= .006	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTR100A	.5732 (51) P= .000	.3837 (51) P= .003	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTR50A	.4896 (51) P= .000	.2747 (51) P= .026	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTR25A	.4036 (51) P= .002	.2419 (51) P= .044	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTR12A	.5332 (51) P= .000	.2936 (51) P= .018	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTR6A	.2910 (51) P= .019	.1732 (51) P= .112	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTJ100A	.4787 (51) P= .000	.2483 (51) P= .039	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTJ50A	.3450 (51) P= .007	.1627 (51) P= .127	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTJ25A	.1404 (51) P= .163	.1005 (51) P= .241	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .

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02 MAR 90   S9772: JOB KNOWLEDGE TEST SCORE ANALYSIS
13:22:15   CORRELATION MATRIX AS PER AMENDMENT 4 PARAGRAPH 1

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	PTJ12A	PTJ8A	PNOVICE	NTR100A	NTR50A	NTR25A	NTR12A	NTR6A	NTJ100A	NTJ50A	NTJ25A
NTJ12A	1.0000 (51) P=0.0	.3057 (51) P= .015	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTJ8A	.3057 (51) P= .015	1.0000 (51) P=0.0	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .

(COEFFICIENT / (CASES) / SIGNIFICANCE)   " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	NTJ12A	NTJ6A	PMASTER	MTR100A	MTR50A	MTR25A	MTR12A	MTR6A	MTJ100A	MTJ50A	MTJ25A
MEANSELF	.1281 (110) P= .089	.2088 (110) P= .014	.3756 (51) P= .003	.3509 (51) P= .006	.4750 (51) P= .000	.2701 (51) P= .028	.2145 (51) P= .065	.2599 (51) P= .033	.3024 (61) P= .015	.2404 (51) P= .045	.1001 (51) P= .242
MEANSUP	.1942 (111) P= .021	.1910 (111) P= .022	.2942 (51) P= .018	.2956 (51) P= .018	.2893 (51) P= .020	-.0753 (51) P= .300	.2133 (51) P= .066	.1401 (51) P= .163	.2393 (51) P= .045	.2569 (51) P= .034	.1194 (51) P= .202
MEANEXP	.0270 (109) P= .390	.1019 (109) P= .146	.2407 (51) P= .044	.2058 (51) P= .074	.4087 (51) P= .001	.0261 (51) P= .428	.1361 (51) P= .170	.2655 (51) P= .030	.1821 (51) P= .100	.1299 (51) P= .182	.0972 (51) P= .249
FGRADE	-.0699 (24) P= .373	-.0596 (24) P= .391	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
PHITS	.3457 (24) P= .049	.0951 (24) P= .329	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
TRSEA	-.1564 (23) P= .238	.1855 (23) P= .198	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
TRSUA	.0280 (23) P= .450	-.1092 (23) P= .310	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
TRPEA	.0464 (23) P= .417	-.1336 (23) P= .272	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
GSSS	.0553 (23) P= .401	-.1265 (23) P= .283	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
ARSS	.1095 (23) P= .309	-.1124 (23) P= .305	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
WKSS	-.2812 (23) P= .087	-.1070 (23) P= .313	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .

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- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

	NTJ12A	NTJ6A	PMASTER	NTR100A	NTR50A	NTR25A	NTR12A	NTR6A	NTJ100A	NTJ50A	NTJ25A
PCSS	.2961 (23) P= .085	.0944 (23) P= .334	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
NDSS	.0424 (23) P= .424	.2696 (23) P= .107	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
CSSS	.3459 (23) P= .053	.3251 (23) P= .065	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
ASSS	.2665 (23) P= .109	.0824 (23) P= .354	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MKSS	-.0464 (23) P= .417	-.1982 (23) P= .182	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MCSS	.3207 (23) P= .068	-.0747 (23) P= .367	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
EISS	.1473 (23) P= .251	.1363 (23) P= .267	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
VERB	-.1102 (23) P= .308	-.0414 (23) P= .426	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
MECH	.2997 (23) P= .082	-.0016 (23) P= .497	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
ADMIN	.1892 (23) P= .194	.3274 (23) P= .063	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
GEN	.0319 (23) P= .442	-.1338 (23) P= .271	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .

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	NTJ12A	NTJ6A	PMASTER	MTR100A	MTR50A	MTR25A	MTR12A	MTR6A	MTJ100A	MTJ50A	MTJ25A
ELEC	.1412 (23) P= .260	-.1272 (23) P= .281	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
AFQT	.0163 (23) P= .471	.0082 (23) P= .485	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .	. (1) P= .
PTOTAL	.6104 (111) P= .000	.4119 (111) P= .000	1.0000 (51) P=0.0	.9012 (51) P= .000	.8414 (51) P= .000	.5621 (51) P= .000	.7663 (51) P= .000	.5717 (51) P= .000	.9319 (51) P= .000	.8377 (51) P= .000	.6718 (51) P= .000
PTR100A	.5389 (111) P= .000	.4133 (111) P= .000	.9012 (51) P= .000	1.0000 (51) P=0.0	.7979 (51) P= .000	.5512 (51) P= .000	.7180 (51) P= .000	.5896 (51) P= .000	.8489 (51) P= .000	.7294 (51) P= .000	.5937 (51) P= .000
PTR50A	.4601 (111) P= .000	.3603 (111) P= .000	.8414 (51) P= .000	.7979 (51) P= .000	1.0000 (51) P=0.0	.4597 (51) P= .000	.7008 (51) P= .000	.6035 (51) P= .000	.7631 (51) P= .000	.5927 (51) P= .000	.5529 (51) P= .000
PTR25A	.3246 (111) P= .000	.1735 (111) P= .034	.5621 (51) P= .000	.5512 (51) P= .000	.4597 (51) P= .000	1.0000 (51) P=0.0	.4823 (51) P= .000	.4653 (51) P= .000	.6165 (51) P= .000	.5212 (51) P= .000	.4502 (51) P= .000
PTR12A	.3185 (111) P= .000	.2800 (111) P= .003	.7663 (51) P= .000	.7180 (51) P= .000	.7008 (51) P= .000	.4823 (51) P= .000	1.0000 (51) P=0.0	.4385 (51) P= .001	.7269 (51) P= .000	.5829 (51) P= .000	.5179 (51) P= .000
PTR6A	.2333 (111) P= .007	.1120 (111) P= .121	.5717 (51) P= .000	.5896 (51) P= .000	.6035 (51) P= .000	.4653 (51) P= .000	.4385 (51) P= .001	1.0000 (51) P=0.0	.5912 (51) P= .000	.4811 (51) P= .000	.5308 (51) P= .000
PTJ100A	.5667 (111) P= .000	.4052 (111) P= .000	.9319 (51) P= .000	.8489 (51) P= .000	.7631 (51) P= .000	.6165 (51) P= .000	.7269 (51) P= .000	.5912 (51) P= .000	1.0000 (51) P=0.0	.8467 (51) P= .000	.6951 (51) P= .000
PTJ50A	.4289 (111) P= .000	.3129 (111) P= .000	.8377 (51) P= .000	.7294 (51) P= .000	.5927 (51) P= .000	.5212 (51) P= .000	.5829 (51) P= .000	.4811 (51) P= .000	.8467 (51) P= .000	1.0000 (51) P=0.0	.6463 (51) P= .000
PTJ25A	.4779 (111) P= .000	.2191 (111) P= .010	.6718 (51) P= .000	.5937 (51) P= .000	.5529 (51) P= .000	.4502 (51) P= .000	.5179 (51) P= .000	.5308 (51) P= .000	.6951 (51) P= .000	.6463 (51) P= .000	1.0000 (51) P=0.0

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	NTJ12A	NTJ6A	PMASTER	MTR100A	MTR50A	MTR25A	MTR12A	MTR6A	MTJ100A	MTJ50A	MTJ25A
PTJ12A	1.0000 (111) P=0.0	.2870 (111) P= .001	.5294 (51) P= .000	.5732 (51) P= .000	.4896 (51) P= .000	.4036 (51) P= .002	.5332 (51) P= .000	.2910 (51) P= .019	.4787 (51) P= .000	.3450 (51) P= .007	.1404 (51) P= .163
PTJ6A	.2870 (111) P= .001	1.0000 (111) P=0.0	.3601 (51) P= .005	.3837 (51) P= .003	.2747 (51) P= .025	.2419 (51) P= .044	.2936 (51) P= .018	.1732 (51) P= .112	.2483 (51) P= .039	.1627 (51) P= .127	.1005 (51) P= .241
PNOVICE	.6104 (111) P= .000	.4119 (111) P= .000	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTR100A	.5389 (111) P= .000	.4133 (111) P= .000	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTR50A	.4801 (111) P= .000	.3603 (111) P= .000	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTR25A	.3246 (111) P= .000	.1735 (111) P= .034	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTR12A	.3185 (111) P= .000	.2590 (111) P= .003	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTR6A	.2333 (111) P= .007	.1120 (111) P= .121	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTJ100A	.5667 (111) P= .000	.4052 (111) P= .000	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTJ50A	.4289 (111) P= .000	.3129 (111) P= .000	. (C) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTJ25A	.4779 (111) P= .000	.2191 (111) P= .010	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .

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- - - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - - -

	NTJ12A	NTJ6A	PMASTER	NTR100A	NTR50A	NTR25A	NTR12A	NTR6A	NTJ100A	NTJ50A	NTJ25A
NTJ12A	1.0000 (111) P= .	.2870 (111) P= .001	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
NTJ6A	.2870 (111) P= .001	1.0000 (111) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .	. (0) P= .
PMASTER	. (0) P= .	. (0) P= .	1.0000 (51) P= .	.9012 (51) P= .000	.8414 (51) P= .000	.5621 (51) P= .000	.7663 (51) P= .000	.5717 (51) P= .000	.9319 (51) P= .000	.8377 (51) P= .000	.6718 (51) P= .000
NTR100A	. (0) P= .	. (0) P= .	.9012 (51) P= .000	1.0000 (51) P= .	.7979 (51) P= .000	.5512 (51) P= .000	.7180 (51) P= .000	.5896 (51) P= .000	.8489 (51) P= .000	.7294 (51) P= .000	.5937 (51) P= .000
NTR50A	. (0) P= .	. (0) P= .	.8414 (51) P= .000	.7979 (51) P= .000	1.0000 (51) P= .	.4597 (51) P= .000	.7008 (51) P= .000	.6035 (51) P= .000	.7631 (51) P= .000	.5927 (51) P= .000	.5529 (51) P= .000
NTR25A	. (0) P= .	. (0) P= .	.5621 (51) P= .000	.5512 (51) P= .000	.4597 (51) P= .000	1.0000 (51) P= .	.4823 (51) P= .000	.4653 (51) P= .000	.6165 (51) P= .000	.5212 (51) P= .000	.4502 (51) P= .000
NTR12A	. (0) P= .	. (0) P= .	.7663 (51) P= .000	.7180 (51) P= .000	.7008 (51) P= .000	.4823 (51) P= .000	1.0000 (51) P= .	.4385 (51) P= .001	.7269 (51) P= .000	.5828 (51) P= .000	.5179 (51) P= .000
NTR6A	. (0) P= .	. (0) P= .	.5717 (51) P= .000	.5896 (51) P= .000	.6035 (51) P= .000	.4653 (51) P= .000	.4385 (51) P= .001	1.0000 (51) P= .	.5912 (51) P= .000	.4811 (51) P= .000	.5308 (51) P= .000
NTJ100A	. (0) P= .	. (0) P= .	.9319 (51) P= .000	.8489 (51) P= .000	.7631 (51) P= .000	.6165 (51) P= .000	.7269 (51) P= .000	.5912 (51) P= .000	1.0000 (51) P= .	.8467 (51) P= .000	.6951 (51) P= .000
NTJ50A	. (0) P= .	. (0) P= .	.8377 (51) P= .000	.7294 (51) P= .000	.5927 (51) P= .000	.5212 (51) P= .000	.5829 (51) P= .000	.4811 (51) P= .000	.8467 (51) P= .000	1.0000 (51) P= .	.6463 (51) P= .000
NTJ25A	. (0) P= .	. (0) P= .	.6718 (51) P= .000	.5937 (51) P= .000	.5529 (51) P= .000	.4502 (51) P= .000	.5179 (51) P= .000	.5308 (51) P= .000	.6951 (51) P= .000	.6463 (51) P= .000	1.0000 (51) P= .

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13:22:18 CORRELATION MATRIX AS PER AMENDMENT 4 PARAGRAPH 1

- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	NTJ12A	NTJ6A	PMASTER	MTR100A	MTR50A	MTR25A	MTR12A	MTR6A	MTJ100A	MTJ50A	MTJ25A
MTJ12A	.	.	.5294	.5732	.4896	.4038	.5332	.2910	.4787	.3450	.1404
	(0)	(0)	(51)	(51)	(51)	(51)	(51)	(51)	(51)	(51)	(51)
	P= .	P= .	P= .000	P= .000	P= .000	P= .002	P= .000	P= .019	P= .000	P= .007	P= .163
MTJ6A	.	.	.3601	.3837	.2747	.2419	.2936	.1732	.2483	.1627	.1005
	(0)	(0)	(51)	(51)	(51)	(51)	(51)	(51)	(51)	(51)	(51)
	P= .	P= .	P= .005	P= .003	P= .025	P= .044	P= .018	P= .112	P= .039	P= .127	P= .241

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13:22:18   CORRELATION MATRIX AS PER AMENDMENT 4 PARAGRAPH 1

- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

	NTJ12A	NTJ6A
MEANSELF	.1826 (51) P= .100	.3398 (51) P= .007
MEANSUP	-.0401 (51) P= .390	.1707 (51) P= .116
MEANEXP	.0373 (51) P= .397	.2081 (51) P= .074
PGRADE	. (0) P= .	. (0) P= .
PHITS	. (1) P= .	. (1) P= .
TRSEA	. (1) P= .	. (1) P= .
TRSUA	. (1) P= .	. (1) P= .
TRPEA	. (1) P= .	. (1) P= .
GSSS	. (1) P= .	. (1) P= .
ARSS	. (1) P= .	. (1) P= .
WKSS	. (1) P= .	. (1) P= .

(COEFFICIENT / (CASES) / SIGNIFICANCE)   " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

	MTJ12A	MTJ8A
PCSS	. (1) P= .	. (1) P= .
NDSS	. (1) P= .	. (1) P= .
CSSS	. (1) P= .	. (1) P= .
ASSS	. (1) P= .	. (1) P= .
MKSS	. (1) P= .	. (1) P= .
MCSS	. (1) P= .	. (1) P= .
EISS	. (1) P= .	. (1) P= .
VERB	. (1) P= .	. (1) P= .
MECH	. (1) P= .	. (1) P= .
ADMIN	. (1) P= .	. (1) P= .
GEN	. (1) P= .	. (1) P= .

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- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	MTJ12A	MTJ6A
ELEC	. (1) P= .	. (1) P= .
AFQT	. (1) P= .	. (1) P= .
PTOTAL	.5294 (51) P= .000	.3601 (51) P= .005
PTR100A	.5732 (51) P= .000	.3837 (51) P= .003
PTR50A	.4896 (51) P= .000	.2747 (51) P= .025
PTR25A	.4036 (51) P= .002	.2419 (51) P= .044
PTR12A	.5332 (51) P= .000	.2936 (51) P= .018
PTR6A	.2910 (51) P= .019	.1732 (51) P= .112
PTJ100A	.4787 (51) P= .000	.2483 (51) P= .039
PTJ50A	.3450 (51) P= .007	.1627 (51) P= .127
PTJ25A	.1404 (51) P= .163	.1005 (51) P= .241

(COEFFICIENT / (CASES) / SIGNIFICANCE) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	NTJ12A	NTJ6A
PTJ12A	1.0000 (51) P=0.0	.3057 (51) P= .015
PTJ6A	.3057 (51) P= .015	1.0000 (51) P=0.0
PNOVICE	. (0) P= .	. (0) P= .
NTR100A	. (0) P= .	. (0) P= .
NTR50A	. (0) P= .	. (0) P= .
NTR25A	. (0) P= .	. (0) P= .
NTR12A	. (0) P= .	. (0) P= .
NTR6A	. (0) P= .	. (0) P= .
NTJ100A	. (0) P= .	. (0) P= .
NTJ50A	. (0) P= .	. (0) P= .
NTJ25A	. (0) P= .	. (0) P= .

(COEFFICIENT / (CASES) / SIGNIFICANCE) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

	NTJ12A	NTJ6A
NTJ12A	.	.
	(0)	(0)
	P= .	P= .
NTJ6A	.	.
	(0)	(0)
	P= .	P= .
PMASTER	.5294	.3601
	(51)	(51)
	P= .000	P= .005
NTR100A	.5732	.3837
	(51)	(51)
	P= .000	P= .003
NTR50A	.4896	.2747
	(51)	(51)
	P= .000	P= .025
NTR25A	.4036	.2419
	(51)	(51)
	P= .002	P= .044
NTR12A	.5332	.2936
	(51)	(51)
	P= .000	P= .018
NTR6A	.2910	.1732
	(51)	(51)
	P= .019	P= .112
NTJ100A	.4787	.2483
	(51)	(51)
	P= .000	P= .039
NTJ50A	.3450	.1627
	(51)	(51)
	P= .007	P= .127
NTJ25A	.1404	.1005
	(51)	(51)
	P= .163	P= .241

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